CHILLING EFFECTS: ONLINE SURVEILLANCE AND WIKIPEDIA USE

*Jonathon W. Penney**

ABSTRACT

This article discusses the results of the first empirical legal study providing evidence of regulatory "chilling effects" of Wikipedia users associated with online government surveillance. The study explores how traffic to Wikipedia articles on topics that raise privacy concerns for Wikipedia users decreased after the widespread publicity about NSA/PRISM surveillance revelations in June 2013. Using an interdisciplinary research design, the study tests the hypothesis, based on chilling effects theory, that traffic to privacy-sensitive Wikipedia articles reduced after the mass surveillance revelations. The Article finds not only a statistically significant immediate decline in traffic for these Wikipedia articles after June 2013, but also a change in the overall secular trend in the view count traffic, suggesting not only immediate but also long-term chilling effects resulting from the NSA/PRISM online surveillance revelations. These, and other results from the case study, not only offer compelling evidence for chilling effects associated with online surveillance, but also offer important insights about how we should understand such chilling effects and their scope, including how they interact with other dramatic or significant events (like war and conflict) and their broader implications for privacy, U.S. constitutional litigation, and the health of democratic society. This study is among the first to demonstrate— using either Wikipedia data or web traffic data more generally— how government surveillance and similar actions impact online activities, including access to information and knowledge online.

I. INTRODUCTION

On March 10, 2015, the American Civil Liberties Union, on behalf of the Wikimedia Foundation and eight other organizations, filed a lawsuit against the United States Department of Justice and the National Security Agency (NSA) challenging the constitutionality of NSA online surveillance:

> This lawsuit challenges the suspicionless seizure and searching of internet traffic by the National Security Agency ("NSA") on U.S. soil. The NSA conducts this surveillance, called "Upstream" surveillance, by tapping directly into the internet backbone inside the United States—the network of high-capacity cables, switches, and routers that today carry vast numbers of Americans' communications with each other and with the rest of the world. In the course of this surveillance,

> the NSA is seizing Americans' communications en masse while they are in transit, and it is searching the contents of substantially all international text-based communications—and many domestic communications as well—for tens of thousands of search terms. The surveillance exceeds the scope of the authority that Congress provided in the FISA Amendments Act of 2008 ("FAA") and violates the First and Fourth Amendments.[1]

An Op-Ed published the same day in *The New York Times*, co-authored by Wikipedia Founder Jimmy Wales and Wikimedia Foundation's Executive Director Lila Tretikov, explained the lawsuit was necessary because "pervasive surveillance" caused "a chilling effect" that stifled the "freedom of expression" and "free exchange" of ideas on Wikipedia,[2] the collaborative online encyclopedia that is global in both content and scope—it contains over 30 million articles available in over 200 languages and is among the ten most visited websites globally.[3] However, like previous constitutional challenges to

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1 Complaint for Declaratory and Injunctive Relief at 1, Wikimedia Found. v. NSA, No. 1:15-cv-00662-RDB, 2015 WL 1033734, (D. Md. Mar. 10, 2015), https://www.aclu.org/files/assets/wikimedia_v2c_nsa_-_complaint.pdf. For a definition of mass surveillance, *see* Ben Beaumont, *Easy Guide to Mass Surveillance*, AMNESTY INTERNATIONAL (Mar. 18, 2015), https://www.amnesty.org/en/latest/campaigns/2015/03/easy-guide-to-mass-surveillance/.

2 Jimmy Wales & Lila Tretikov, Opinion,*Stop Spying on Wikipedia Users*, N.Y. TIMES(Mar. 10, 2015), http://www.nytimes.com/2015/03/10/opinion/stop-spying-on-wikipedia-users.html

3 *See* Judit Bar-Ilan & Noa Aharony, *Twelve Years of Wikipedia Research*, PROCEEDINGS OF THE 5TH ACM CONFERENCE ON WEB SCIENCE 243, 243 (2014); David J. McIver & John S. Brownstein, *Wikipedia Usage Estimates Prevalence of Influenza-Like Illness in the United States in Near Real-Time*, 10:4 PLOS COMPUTER BIOLOLOGY 1, 1 (2014); Stefanie Hilles, *To Use or Not to Use? The Credibility of Wikipedia*, 10:3 PUBLIC SERVICE QUARTERLY 245 (2014).Wikipedia provides a wealth of information about its number of articles, editors, page views, etc. *See*Wikimedia Statistics, http://stats.wikimedia.org/#fragment-14 ("The Analytics team

NSA surveillance,[4] the lawsuit was not heard on the merits but dismissed in October for lack of standing.[5] Wikimedia Foundation, the lead complainant, intends to appeal.[6]

The idea that government surveillance is harmful to free expression and association is not new, nor is skepticism about its empirical and legal basis. In the 1972 Supreme Court case *Laird v. Tatum*, for example, the complainants argued that broad government surveillance and data gathering unconstitutionally chilled the their rights.[7] The Court rejected the claim due to lack of standing, finding that the surveillance did not constitute an "objective harm or a threat of specific future harm."[8] The decision reflected a deep skepticism about both the potential chilling effects and attendant harms of surveillance.[9] Such "judicial skepticism"[10] has persisted over the decades. In a 2013 case, *Clapper v. Amnesty International*,[11] the Court cited to *Laird* to dismiss a

empowers and supports data informed decision making across the Foundation and the Community.").

4 *See e.g.,* Clapper v. Amnesty Int'l, 568 U.S. ___, ___, 133 S. Ct. 1138, 1152 (2013) (dismissing a constitutional challenge to NSA surveillance practices for lack of standing).

5 Wikimedia Foundation, et al. v. NSA, et al., Case 1:15-cv-00662-RDB, slip opinion, 2015 WL 6460364 (D. Md. Oct. 23, 2015).

6 Michelle Paulson and Geoff Brigham, *District Court Grants Government's Motion to Dismiss Wikimedia v. N.S.A., Appeal Expected*, WIKIMEDIA BLOG(Oct. 23, 2015), http://blog.wikimedia.org/2015/10/23/wikimedia-v-nsa-lawsuit-dismissal/ ("Unfortunately, the court did not actually rule on whether the NSA's upstream surveillance is legal or illegal. Judge T.S. Ellis III, the presiding judge, dismissed the case on standing grounds... We respectfully disagree with the Court's decision to dismiss. There is no question that Upstream surveillance captures the communications of both the user community and the Wikimedia Foundation itself. We believe that our claims have merit. In consultation with our lawyers at the ACLU, we will review the decision and expect to appeal to the Fourth Circuit Court of Appeals.").

7 Laird v. Tatum, 408 U.S. 1, 13–14 (1972) ("[The respondents'] claim, simply stated, is that they disagree with the judgments made by the Executive Branch with respect to the type and amount of information the Army needs, and that the very existence of the Army's data-gathering system produces a constitutionally impermissible chilling effect upon the exercise of their First Amendment rights. That alleged 'chilling' effect may perhaps be seen as arising from respondents' very perception of the system as inappropriate to the Army's role under our form of government, or as arising from respondents' beliefs that it is inherently dangerous for the military to be concerned with activities in the civilian sector, or as arising from respondents' less generalized yet speculative apprehensiveness that the Army may at some future date misuse the information in some way that would cause direct harm to respondents... Allegations of a subjective 'chill' are not are not an adequate substitute for a claim of specific present objective harm or a threat of specific future harm."). Chilling effects theory is discussed in more detail in Part II.A of this Article.

8 *Id.* at 15.

9 *See* Margot E. Kaminski & Shane Witnov, *The Conforming Effect: First Amendment Implications of Surveillance, Beyond Chilling Speech*, 49 U. RICH. L. REV. 465, 480 (2015).

10 *Id.* at 482.

11 Clapper, *supra* note 4, at 1152.

challenge to the legality of NSA surveillance authorized by the Foreign Intelligence Surveillance Act (FISA), and noted that chilling effects fears were "too speculative."

Skepticism about chilling effects is not confined to courts. Legal commentators have long questioned the existence or scope (beyond mere triviality) of surveillance related chilling effects harms, or expressed skepticism as to whether the premises of chilling effects theory could be empirically substantiated. Even Frederick Schauer, who offered an early classic statement of chilling effects theory and doctrine, admitted in 1978 that its empirical assumptions about human behavior were "most likely unprovable."[12] Nearly a decade after Schauer, Vincent Blasi observed that the notion of "chilling effects" on supposed "fearful and overly risk-averse" speakers was "oft-criticized" and based on "crude behavioral speculation."[13] More recently, Leslie Kendrick, after surveying both literature and case law, emphasized the theory's "weak" and "flimsy" empirical basis and concluded additional research was required for the "unsubstantiated empirical judgments" of chilling effects claims.[14] Also recently, Margot Kaminski and Shane Witnov, while acknowledging certain social science studies that corroborate forms of chilling effects, nevertheless called for more empirical work on surveillance and its impact in a "number of critical areas," including the existence, magnitude, and persistence of surveillance related chilling effects.[15]

Privacy theorists, security researchers, and social scientists have also expressed skepticism about the possibility of large scale chilling effects caused by online surveillance.[16] One reason for such skepticism is increasing public acceptance of, or desensitization to, privacy and surveillance concerns,

12 Frederick Schauer, *Fear, Risk, and the First Amendment: Unraveling the "Chilling Effect"*, 58 B.U. L. REV. 685, 730 (1978).

13 Vincent Blasi, *The Pathological Perspective and the First Amendment*, 85 COLUM. L. REV. 449, 482 (1985).

14 Leslie Kendrick, *Speech, Intent, and the Chilling Effect*, 54 WM. MARY L. REV. 1633, 1657 (2013).

15 Kaminski &Witnov, *supra* note 9, at 517(calling for further research on the "types of surveillance and surveillance cues that cause chilling effects", as well as the strength and persistence of such chilling effects).

16 *See e.g.*, Daniel Solove, *The First Amendment as Criminal Procedure*, 82 N.Y.U. L. REV. 112, 155 (2007)("Determining the existence of a chilling effect is complicated by the difficulty of defining and identifying deterrence. It is hard to measure the deterrence caused by a chilling effect because it is impossible to determine with certainty what people would have said or done in the absence of the government activity. Often, the primary evidence will be a person's own assertions that she was chilled, but merely accepting such assertions at face value would allow anyone claiming a chilling effect to establish one. At the same time, demanding empirical evidence of deterrence is impractical because it will often be impossible to produce.").

particularly in new technological contexts.[17] Indeed, some research in the field suggests that any chilling effects would, at the very most, be temporary or ephemeral, as online users have shifted quickly in response to shifting norms.[18]

So, the empirical basis for chilling effects theory, and its different dimensions, remain controversial. Part of the challenge, as privacy scholars like Kendrick,[19] Daniel Solove,[20] and Neil Richards[21] have noted, is the often

17 *See* David Lyon, *Surveillance, Snowden, and Big Data*: *Capacities, Consequences, Critique*, 1 BIG DATA & SOC'Y 1, 51 (2014) (noting that the constant "ratcheting up" of government surveillance in recent times is not just a product of the growth of new technologies, but also broader cultural trends accommodating increasing amounts of societal surveillance); BRUCE SCHNEIER, DATA AND GOLIATH: THE HIDDEN BATTLES TO CAPTURE YOUR DATA AND CONTROL YOURWORLD95-99 CH. 6 (2015) (Schneier, a leading information security expert, speaks of how surveillance leads to "conformity" (95-99) and, in Chapter 6, generally discusses the need to change lax and accepting public attitudes about increasing surveillance and its harms); Sandro Nickel, *The Double-Edged Effects of Social Media Terror Communication: Interconnection and Independence vs. Surveillance and Human Rights Calamities*, in NEW OPPORTUNITIES AND IMPASSES: THEORIZING AND EXPERIENCING POLITICS 255, 263(Zeynep Guler, ed., 2014) ("The majority of the population will most probably not fall into self-censoring behavior, a reason for this possibly being the desensitization concerning privacy in general, at least co-constituted by the very digital experiences of the past decade(s)...").

18 Bernhard Debatin & Jennette P. Lovejoy, *Facebook and Online Privacy: Attitudes, Behaviors, and Unintended Consequences*, 15:1 J. COMPUTER-MEDIATED COMM. 83 (2009), http://dx.doi.org/10.1111/j.1083-6101.2009.01494.x (documenting Facebook users' "lax" attitudes about privacy concerns). For research or works suggesting online chilling effects would be temporary or ephemeral, see Laura Bernescu, *When is a Hack not a Hack: Addressing the CFAA's Applicability to the Internet Service Context,* U. CHI. LEGAL F. 633 (2013)(arguing that users will quickly adopt to changes in the regulatory environment in relation to the Computer Fraud and Abuse Act, rendering any "chilling effects" temporary); Chris Rose, *The Security Implications of Ubiquitous Social Media*, 15:1INT'L J. MGMT & INF. SYS. 35, 37 (2011) (noting that increased comfort with using the Internet has led many consumers to conform to new norms, particularly on privacy). *See also* Alessandro Acquisti, Leslie K. John & George Loewenstein, *What is Privacy Worth?*, 42 J. LEGAL STUD. 249, [pin cite] (2013), https://www.cmu.edu/dietrich/sds/docs/loewenstein/WhatPrivacyWorth.pdf(advancing explanations for the disconnect between privacy attitudes and the lax or loose approach to privacy in practice).

19 Kendrick, *supra* note 14, at 1638 ("But there are reasons to doubt the chilling effect account. A claim of a chilling effect necessarily rests upon suppositions about the deterrent effects of law. These suppositions rest in turn upon predictions about the behavior of speakers under counterfactual conditions. Meanwhile, the selection of a remedy for chilling—such as an intent requirement—rests on similar predictions about the remedy's speech-protective effects. In short, both the detection of a problem and the imposition of a remedy involve intractable empirical difficulties.").

20 Solove, *supra* note 16, at 155 ("Often, the primary evidence will be a person's own assertions that she was chilled, but merely accepting such assertions at face value would allow anyone claiming a chilling effect to establish one. At the same time, demanding empirical evidence of deterrence is impractical because it will often be impossible to produce.").

21 Neil Richards, *The Dangers of Surveillance*, 126 HARV. L. REV. 1934, 1964 (2013)("This is not to say that individual determinations of the chilling of intellectual activities will always be easy. Determining whether a chill to intellectual privacy is substantial would certainly present difficult cases at the margins.").

"intractable empirical difficulties" in designing research to demonstrate or measure chilling effects.[22] Showing the impact and harms of surveillance involves dealing with counterfactuals or proving a negative—self-censorship. As such, it is "difficult to establish either the presence or the absence of a chilling effect, let alone to measure the extent of such an effect".[23] With the absence of sound empirical research to substantiate chilling effects, compounded by the methodological challenges for designing and carrying out such research, it is unsurprising skepticism about the theory persists.

With the revelation of widespread internet surveillance by the United States and other Western governments (thanks to the leaks and disclosures of Edward Snowden), the need for empirical and theoretical study has taken on even greater urgency. This is particularly true because of the range of lawsuits filed by companies, citizen groups, and organizations to challenge government surveillance and related laws,[24] but beyond the legal arena, it is crucial for understanding the potential harms of such surveillance to activities online.

The empirical case study discussed in this Article attempts to address this research void. Building on a recent study of Google search traffic and Internet surveillance,[25] this Article discusses the first original empirical study of the impact such surveillance has had on Wikipedia use. Consistent with the recent growth of empirical approaches in legal research[26], the study uses an empirical

22 Kendrick, *supra* note 14, at 1675.

23 *Id.* at 1638.

24 For a review of the broad range of constitutional litigation arising since the Snowden leaks, see generally: Edward C. Liu, Andrew Nolan, & Richard M. Thompson, CONG. RESEARCH SERV., R43459, OVERVIEW OF CONSTITUTIONAL CHALLENGES TO NSA COLLECTION ACTIVITIES AND RECENT DEVELOPMENTS7-5700, 1 (2014)("Beginning in the summer of 2013, media reports of foreign intelligence activities conducted by the National Security Agency (NSA) have been published and are apparently based on unauthorized disclosures of classified information by Edward Snowden, a former NSA contractor... As the public's awareness of these programs has grown, Members of Congress and the public have increasingly voiced concerns about the constitutionality of these programs. This report provides a description of these two programs and the various constitutional challenges that have arisen in judicial forums with respect to each.").

25 Alex Marthews & Catherine Tucker, *Government Surveillance and Internet Search Behavior*, (MIT Sloane Working Paper No. 14380, Apr. 29, 2015), https://mitsloan.mit.edu/shared/ods/documents/Tucker_WP_2015_Government.pdf&PubID=14380

26 For discussion of the empirical and experimental turn in legal research, see Daniel E. Ho & Larry Kramer, *Introduction: The Empirical Revolution in Law*, 65 STAN. L. REV. 1195 (2013). *See generally* Gregory Shaffer & Tom Ginsburg, *The Empirical Turn In International Legal Scholarship*, 106 AM. J. INT'L L. 1 (2012) (also discussing the empirical "turn" in international law research). *See also* Adam Chilton & Dustin Tingley, *Why the Study of International Law Needs Experiments*, 52 COLUMB. J. TRANS. L. 173, 180, 187-190 (2013) (discussing the "growth" of experimental and quasi-experimental methods in legal research).

interrupted time series (ITS) design[27] to determine whether traffic for articles that may raise privacy concerns for Wikipedia users decreased after the widespread publicity about NSA online surveillance activities. In short, this case study asks: Did Wikipedia traffic for articles on privacy-sensitive topics decrease after the "exogenous shock" of widespread publicity surrounding the surveillance programs in June2013?

A hypothesis based on chilling effects theory would hold that Internet users will be less likely to view or access such privacy-sensitive Wikipedia articles after the revelations. Ultimately, this case study provides results consistent with surveillance related chilling effects, among other findings. The context of the study is also important. Wikipedia was chosen as the focus of this case study for a number reasons (discussed in more detail in Part III), but most importantly because any chilling effect on Wikipedia users has far-reaching implications. The site, which is growing both in popularity and scope, serves as an essential source of information and knowledge online, and functions as an important public tool to complement the democratic process in promoting collective understanding, decision-making, and deliberation.[28]

Part II of the Article provides additional context related to chilling effects research and the impact of the Edward Snowden disclosures. Part III sets out and justifies the case study's methodology and research design, including its focus on Wikipedia. Part IV discusses the results of the study: Consistent with chilling effects theory, (1) Wikipedia traffic to privacy-sensitive articles showed a statistically significant reduction after June 2013, and (2) there was a long lasting change in the overall secular trend in traffic to such articles. The study's implications are discussed in Part V. Part VI concludes and considers possible directions for future research.

27 For discussion of interrupted time series research design, see DONALD T. CAMPBELL, JULIAN C. STANLEY, & NATHANIEL L. GAGE, EXPERIMENTAL AND QUASI-EXPERIMENTAL DESIGNS FOR RESEARCH 37-43 (1966) (discussing the components of time series designs and their methodological advantages and limitations...); Melvin M. Mark, Charles S. Reichardt, & Lawrence J. Sanna, *Time-Series Designs and Analyses* in HANDBOOK OF APPLIED MULTIVARIATE STATISTICS AND MATHEMATICAL MODELING 354-355 (2000) (discussing the use of time series designs to assess the impact of interventions). *See also* Carlotta Ching Ting Fok, David Henry, & James Allen, *Research Designs for Intervention Research with Small Samples II: Stepped Wedge and Interrupted Time-Series Designs*, PREVENTATIVE SCIENCE 1, 4 (2015) (published online May 29, 2015): http://link.springer.com/article/10.1007/s11121-015-0569-4 (offers some suggestions to strengthen the methodological dimensions of ITS designs to study the impact of health interventions); A.K. Wagner, F. Zhang, & D. Ross-Degnan, *Segmented Regression Analysis of an Interrupted Time Series in Medication Use Research*, 27 J. CLINICAL PHARMACY AND THERAPEUTICS 299 (2002) (a discussion advantages of using of segmented regression analysis, along with ITS design, in the context of health research); Robert B. Penfold, Fang Zhang, *Use of Interrupted Time Series Analysis in Evaluating Health Care Quality Improvements*, 13:6 ACADEMIC PEDIATRICS S38 (2013) (discussing the advantages and limitations of employing time series analysis to understand and explore the impact of health policy changes).

28 *See infra* notes 123-129 and accompanying text.

II. CHILLING EFFECTS THEORY AND RESEARCH AFTER SNOWDEN

This section provides a more in depth discussion of chilling effects theory, including leading accounts of its dimensions and assumptions and an overview of related studies. From there, the Snowden leaks are discussed and re-framed as presenting a research opportunity to study chilling effects theory. This idea is developed in the latter parts of the section, with a research design— employed by the case study discussed in this article— centered on Snowden revelations about the NSA's PRISM surveillance program, widely covered in June 2013, as a reference point for study.

A. CHILLING EFFECTS THEORY

The idea that government laws or actions might chill peoples' free activities gained its most prominent early expression in U.S. during the Cold War. The "chilling effects doctrine," a legal doctrine in First Amendment jurisprudence, took shape in a series of cases decided in the 1950s and 60s that dealt with anti-communist state measures; essentially, the doctrine encouraged courts to treat rules or government actions that "might deter" the free exercise of First Amendment rights "with suspicion."[29]

But underlying this legal doctrine was a deeper theory with empirical assumptions about behavior in relation to government acts—that certain state acts may chill or deter people from exercising their freedoms or engaging in legal activities. This theory of "chilling effects" received its first comprehensive exploration in Schauer's *Fear, Risk, and the First Amendment: Unraveling the "Chilling Effects Doctrine,*[30] described as the "definitive treatment" of the theory, Schauer conceived of chilling effects as primarily resulting from peoples' fear of prosecution or legal sanction and the uncertainties of the legal process.[31]Here, government surveillance may chill or deter people from

29 Richards, *supra* note 21, at 1949-1950. For discussion of the origins of the doctrine, see generally Schauer, *supra* note 12 (discussing the origins, mechanisms, and foundations for chilling effects doctrine). For the early cases recognizing the chilling effects doctrine, see for example Wieman v. Updegraff 344 U.S. 183 (1952); Dombrowski v. Pfister 380 U.S. 479 (1965).

30 Schauer, *supra* note 12 (a comprehensive discussion of the origins, mechanics, and foundations for chilling effects doctrine).

31 Schauer, *supra* note 12, at 687-689. For a discussion of Schauer as the "definitive treatment," see Julie Cohen, *A Right to Read Anonymously: A Closer Look at 'Copyright Management' in Cyberspace*, 28 CONN. L. REV. 981, n.117 (1996) (suggesting Schauer's work was the "definitive treatment"). For applications of chilling effects theory to online contexts, scholars at the Berkman Center for Internet & Society at Harvard University have been particularly

engaging in certain legal (or even desirable) online activities because they fear legal punishment or criminal sanction, and do not trust the legal system to protect their innocence. Daniel Solove's work has likewise broadened chilling effects theory by theorizing and exploring modern surveillance and data gathering, explaining how such practices can create a kind of regulatory "environmental pollution" that encourages chilling effects and self-censorship.[32] While Solove's approach does not discount the sorts of chilling effects Schauer targets, he focuses primarily on how government surveillance of online activities creates a broader atmosphere of conformity and self-censorship. Solove, by contrast, is concerned with the way regulatory actions—particularly information gathering and surveillance—enhance the risk that a person may suffer harms in the future (e.g., gathering information about a person's activities may increase the risk they are later "victimized" by identity theft or fraud).[33] On this account, people are chilled not because they fear actual punishment for engaging in certain online activities (as Schauer theorizes), but to avoid risks of other kinds of future dignity, reputational, or monetary harms, such as the stigma of being labeled or tracked by state actors as non-conformists, deviants, or criminals, or the broader concern that information gathered about such activities may be leaked or disclosed publicly leading to embarrassment or obtained by third parties and used for nefarious purposes.[34] Such risks and considerations create a societal context that encourages self-censorship.[35] Both of these accounts will be useful to understand and theorize any surveillance related chilling effects observed.[36]

prolific. *See, e.g.*, JONATHAN ZITTRAIN, THE FUTURE OF THE INTERNET—AND HOW TO STOP IT 116, 216 (2008) (exploring the potential chilling effects of perfect enforcement of legal norms by technology measures and the chilling effects caused by citizen surveillance via the proliferation of 'tethered appliances' (like smartphones) with surveillance capacity); Yochai Benkler, *Through the Looking Glass: Alice and the Constitutional Foundations of the Public Domain*, 66 LAW & CONTEMP. PROBS. 173, 216-218 (2003) (arguing that the NET Act and Digital Millennium Copyright Act expand protections for certain legal rights online in such a way that will chill expression); Wendy Seltzer, *Free Speech Unmoored in Copyright's Safe Harbor: Chilling Effects of the DMCA on the First Amendment*, 24 HARV. J. L. & TECH. 171 (2010) (analyzing chilling effects and the DMCA).

32 Daniel Solove, *A Taxonomy of Privacy*, 154 U. PENN. L. REV. 477, 488 (2006).

33 *Id.* at 487.

34 *Id.* at 496 (discussing the example of how information obtained by surveillance was used to discredit and blackmail Martin Luther King, Jr.).

35 *Id.* at 495.

36 The findings in the empirical legal case study discussed in this article may also provide insights, in turn, for these theories as well. For example, Schauer theorizes chilling effects primarily as a product of individual concerns for actual legal punishment or prosecution in an uncertain legal system, while Solove's account captures broader risks and concerns that may also chill— where online users may not actually fear prosecution, but prefer not to have governments looking over their shoulder or tracking and compiling data about their online activities (even if legal). Both such approaches will likely explain or account for instances of

Part of the broader picture is the impact of *covert* surveillance where people are either unaware of surveillance or are only aware of the general possibility of it.[37] The Snowden leaks and disclosures, which rendered previously covert surveillance public, have placed concerns like those Solove explores in urgent and concrete terms,[38] and a range of public opinion polls and survey-based studies have been conducted to study the effects of the disclosures. Studies by PEN America[39] and Pew Research Center[40] provide some empirical foundation for the claim that surveillance has a chilling effect on peoples' activities online, but these survey-based studies have important limitations.

Social science research has long illustrated that self-reported or expressed concerns about privacy do not necessarily reflect people's actual behavior online,[41] a phenomenon sometimes referred to as the "privacy paradox."[42] The

surveillance-related chilling effects, but one explanation may prove more common than the other.

37 *Id.* at 494-496 (relating such surveillance to Jeremy Bentham's idea for 19th century "Panopticon" prison design, or the "Panopticon effect". Solove struggles with the concept of covert surveillance in his discussion of its harms and effects).

38 Christopher Slobogin, *Standing and Covert Surveillance*, 41 PEPP. L. REV. 517, 520 (2014) (noting that as a result of Snowden's disclosures the U.S. federal government has been forced to acknowledge previously covert surveillance practices).

39 The FDR Grp. & Pen Am. Ctr., *Chilling Effects: NSA Surveillance Drives U.S. Writers to Self-Censor*, PEN at3-4 (Nov. 12, 2013),http://www.pen.org/sites/default/files/Chilling%20Effects_PEN%20American.pdf (noting that 28% of the writers surveyed had "curtailed or avoided" certain online activities due to "fear of surveillance"); The FDR Grp. & Pen Am. Ctr., *Global Chilling: The Impact of Mass Surveillance on International Writers*,PEN (Jan. 5 2015), http://www.pen.org/sites/default/files/globalchilling_2015.pdf (international similarly engaging in forms of self-censorship).

40 Keith N. Hampton et al., *Social Media and the 'Spiral of Silence*, PEW RES. CTR., 4 (Aug. 28, 2014), http://www.pewinternet.org/files/2014/08/PI_Social-networks-and-debate_082614.pdf (finding, for example, 86% of respondents less willing to discuss NSA surveillance revelations online, than off); Lee Rainie et al., *Americans' Privacy Strategies Post-Snowden*, PEW RES. INTERNET PROJECT, 4 (Mar. 16, 2015), http://www.pewinternet.org/files/2015/03/PI_AmericansPrivacyStrategies_0316151.pdf (noting that 25% of those aware of surveillance have "changed the patterns" of their use of "technological platforms"); Lee Rainie et al., *Anonymity, Privacy, and Security Online*, PEW RESEARCH CTR. (Sept. 5, 2013), http://www.pewinternet.org/2013/09/05/anonymity-privacy-and-security-online/.

41 *See generally* Spyros Kokolakis, *Privacy Attitudes and Privacy Behaviour: A Review of Current Research on the Privacy Paradox Phenomenon*, COMPUTERS & SOCIETY 1 (2015), http://www.sciencedirect.com/science/article/pii/S0167404815001017#bib0215 (providing a comprehensive explanation and review of "information privacy paradox" literature). *See also* Alessandro Acquisti & Ralph Gross, *Imagined Communities: Awareness, Information Sharing, and Privacy on the Facebook*, *in* PROC.6TH WORKSHOP ON PRIVACY ENHANCING TECH.(2006) (finding that Facebook user attitudes concerning privacy differed from their actual behavior and privacy practices on the platform); J. Alessandro Acquisti, *Privacy in Electronic Commerce and the Economics of Immediate Gratification*, PROC.5TH ACM CONF. ON ELECTRONIC COM. (2004), https://www.heinz.cmu.edu/~acquisti/papers/privacy-gratification.pdf; Acquisti et al., *supra* note 18 (advancing, among other things, explanations for the disconnect between privacy

reasons for this paradox remain contested. Some attribute this disconnect between privacy concerns and actual behavior to uninformed decisions, while others point to faulty research and survey design. But few disagree that compared to how they actually act, people tend to exaggerate privacy concerns, leading to biased or inaccurate results in research that relies primarily on self-reported privacy behaviors.[43] In short, though these survey-based studies provide some helpful empirical foundation for chilling effects, more work needs to be done to uncover chilling effects in practice.

B. POST-SNOWDEN: NEW URGENCY, NEW OPPORTUNITIES FOR RESEARCH

The Snowden disclosures about NSA surveillance provide new opportunities for chilling effects research. On June 6, 2013, stories in *The Guardian* and *The Washington Post* detailed previously undisclosed information and leaked classified documents about the surveillance practices of the United States and other Western governments.[44] The leaked documents also suggested

attitudes and the lax or loose approach to privacy in practice); Bettina Berendt, Oliver Günther, & Sarah Spiekermann, *Privacy in E-commerce: Stated References vs. Actual Behavior*, 48:4 COMM.ACM 101, 104 (2005), http://www.wiwi.hu-berlin.de/professuren/quantitativ/wi/personen/hl/downloads/BGS.pdf (finding Web users disclosure practices online were inconsistent with "stated privacy preferences"); danah boyd & Nicole Ellison, *Social Network Sites: Definition, History, and Scholarship*, 13:1 J. COMPUTER-MEDIATED COMM. 210, 222 (2007), http://onlinelibrary.wiley.com/doi/10.1111/j.1083-6101.2007.00393.x/epdf (noting literature on the privacy paradox); Jim Harper & Solveig Singleton, *With a Grain of Salt: What Consumer Privacy Surveys Don't Tell Us*, COMPETITIVE ENTERPRISE INST. (2001), http://www.cei.org/PDFs/with_a_grain_of_salt.pdf.

42 Susan Barnes, *A Privacy Paradox: Social Networking in the United States*, 11:3 FIRST MONDAY (2006), http://firstmonday.org/article/view/1394/1312.

43 See works cited *supra* note 41 on "privacy paradox" more generally. Alessandro Acquisti, for example, has argued that the difference can be explained by the fact that people's privacy decisions are irrational and based on flawed or incomplete information. *See generally* Acquisti et al., *supra* note 18 (advancing, among other things, explanations for this disconnect between privacy attitudes and the lax or loose approach to privacy in practice). *See also* Harper and Single, *supra* note 41, who argue that survey designs have been flawed, leading to exaggerated self-reported concerns.

44 The June 2013 Snowden leaks centered in large part on "PRISM," a secret mass electronic surveillance program operated by the NSA, but they also revealed equivalent programs operated by the United Kingdom and other countries. The original June 6, 2013 stories detailed NSA collection of phone records and the PRISM surveillance program: Barton Gellman & Laura Poitras, *U.S., British Intelligence Mining Data from Nine U.S. Internet Companies in Broad Secret Program,* WASH. POST (June 6, 2013), http://www.washingtonpost.com/investigations/us-intelligence-mining-data-from-nine-us-internet-companies-in-broad-secret-program/2013/06/06/3a0c0da8-cebf-11e2-8845-d970ccb04497_story.html; Glenn Greenwald, *NSA Collecting Phone Records of Millions of Verizon Customers Daily*, GUARDIAN (June 6, 2013), http://www.theguardian.com/world/2013/jun/06/nsa-phone-records-verizon-court-order. For discussion and analysis of subsequent news stories and revelations about other surveillance practices by the U.S. and other governments, see David Lyon, *Surveillance, Snowden,*

a range of major technology companies were involved with the PRISM program.[45] The revelations about PRISM were followed by stories in June and subsequent months covering a vast array of government surveillance practices and operations, including the monitoring of phone records, e-mails, online chats, and browser histories.[46] The revelations caused a "media and political storm," receiving widespread coverage both in traditional and new media outlets, and sparking a "heated international debate" in the United States, Europe, Russia, and beyond.[47]

Governments cited the "War on Terror" to defend the surveillance programs and this justification was reflected in media coverage of the Snowden revelations, particularly by "legacy" news media.[48] The Snowden leaks and coverage, as media scholar Vian Bakir notes, highlighted the previously limited public awareness about government surveillance activities while also augmenting that awareness.[49] Indeed, at least in the United States, the widespread media coverage has led to greater awareness and concern among the general public about government surveillance activities and anti-terrorism efforts more generally. A Pew study in 2014 found that 77% of U.S. adults had heard something about "the government collecting information about telephone calls, e-mails, and other online communications" as part of

and Big Data:*Capacities, Consequences, Critique*, 1 BIG DATA & SOC'Y 1, 2 (2014); Marthews & Tucker, *supra* note 25, at 5. *See also* Amy Wu et al., *"Whistleblower or Leaker?" Examining the Portrayal and Characterization of Edward Snowden in USA, UK, and HK Posts*, in NEW MEDIA, KNOWLEDGE PRAC. & MULTILITERACIES (Will W.K. Ma et al., eds., 2014), http://link.springer.com/chapter/10.1007/978-981-287-209-8_6; Vian Bakir, *Agenda Building, and Intelligence Agencies: A Systematic Review of the Field from the Discipline of Journalism, Media, and Communications*, 20:2 INT'L J. PRESS/POL. 131 (2015), http://hij.sagepub.com/content/20/2/131.abstract; Keir Giles & Kim Hartmann, *Socio-political Effects of Active Cyber Defence Measures*, 6TH INT'L CONF. ON CYBER CONFLICT (CYCON 2014) (2014),http://ieeexplore.ieee.org/xpl/articleDetails.jsp?reload=true&arnumber=6916393&sortType%3Dasc_p_Sequence%26filter%3DAND%28p_IS_Number%3A6916383%29; Jie Qin, *Hero on Twitter, Traitor on News How Social Media and Legacy News Frame Snowden*, 20:2 INT'L J. PRESS/POL. 166 (2015), http://hij.sagepub.com/content/20/2/166.abstract.

45 Bakir, *supra* note 44,at 132; Lyon, *supra* note 44, at 2-3; Marthews & Tucker, *supra* note 25, at 5-6; Qin, *supra* note 44,at 171.

46 Lyon, *supra* note 44, at 2-3; Marthews & Tucker, *supra* note 25, at 5-6.

47 Bakir, *supra* note 44, at 132; Giles & Hartmann, *supra* note 44, at 24; Marthews & Tucker, *supra* note 25; Qin, *supra* note 44,at 166.

48 Bakir, *supra* note 44, at 133 ("Governments insist that their methods are legal, if secret, and necessary to fight the War on Terror and organized crime"); Marthews & Tucker, *supra* note 25, at 2-6; Nickel, *supra* note 18, at 255 ("The mentioned surveillance programs have always – if 'revealed' or publicly debated from start with – been justified by their assumed worth in preventing terror attacks, e.g. by Obama after the NSA's PRISM program was revealed."); Qin, *supra* note 44, at 178 (finding that a predominant "framing" in traditional news media coverage of the Snowden surveillance disclosures focused on national security terrorism, along with international relations).

49 Bakir, *supra* note 44, at 133.

"efforts to monitor terrorist activity" (with 43% hearing "a lot" and 44% hearing "a little"); another 80% agreed or strongly agreed that "Americans should be concerned" about government surveillance.[50] This increased awareness of online government surveillance—and the focal point provided by the June 2013 revelations—presents a unique opportunity for research.

C. PRISM/NSA REVELATIONS: A REFERENCE POINT FOR STUDY

The NSA/PRISM surveillance revelations in June 2013 (hereinafter "June 2013 revelations") and widespread surrounding publicity constituted a kind of "exogenous shock"—an intervening "focusing event"—that provides a helpful reference point for study.[51] In policy research, the "most prominent" empirical studies of policy change often focus on the impact of certain such "triggering" events, typically involving significant "unplanned jolts" or "shocks" like natural disasters or major economic changes.[52] But studies have even shown that changes in the "tone of media coverage" can create exogenous pressures that lead to important policy and behavioral changes.[53] To understand the impact of these focusing events, an event is taken as a reference point for study and observable data before and after the date that the event took place is compared.[54]

A recent study on Google search traffic by MIT researchers Alex Marthews and Catherine Tucker used such a framework to provide an important contribution to chilling effect research. Their innovative research design treated the June 2013 revelations about government surveillance as an

50 Mary Madden, *Public Perceptions of Privacy and Security in the Post-Snowden Era*, PEW RES. INTERNET PROJECT at 2-3 (Nov. 12, 2014), http://www.pewinternet.org/files/2014/11/PI_PublicPerceptionsofPrivacy_111214.pdf.

51 Graeme Boushey, *Punctuated Equilibrium Theory and the Diffusion of Innovations*, 40 POL'Y STUD. J. 127, 130 (2012).

52 William Lowry, *Potential Focusing Projects and Policy Change*, 34:3 POL'Y STUD. J. 313, 313-315 (2006) (discussing research analyzing the impact on policy (and other social and political factors) caused by focusing or intervening events). *See also* Boushey, *id.* at 130 (discussing the use of focusing events as reference points for policy change studies). *See generally* FRANK R. BAUMGARTNER & BRYAN D. JONES, AGENDAS AND INSTABILITY IN AMERICAN POLITICS (2010) (arguing that dramatic policy shifts can, in part, be attributed to important triggering/focusing events); THOMAS A. BIRKLAND, AFTER DISASTER: AGENDA SETTING, PUBLIC POLICY, AND FOCUSING EVENTS 30-35 (1997) (setting out a framework for studying the impact of "focusing events" on policy changes, including the important role, and impact, of news coverage of such focusing events); PAUL A. SABATIER & HANK C. JENKINS-SMITH, THE ADVOCACY COALITION FRAMEWORK: ASSESSMENT, REVISIONS, AND IMPLICATIONS FOR SCHOLARS AND PRACTITIONERS (1993) (examining, more generally, the role and impact of external events on policy shifts).

53 *See generally* BAUMGARTNER & JONES, *id.* at 39 (generally asserting that dramatic policy shifts can, in part, be attributed to important intervening/triggering/focusing events).

54 Boushey, *supra* note 51, at 130 (discussing investigating focusing events, and their impact, can help understand policy shifts and other changes over time).

exogenous focusing event, and tracked the relative number of searches for certain privacy-sensitive search terms before and after June 2013.[55] Marthews and Tucker found a statistically significant 5% reduction in Google searchers for certain privacy-sensitive search terms after June 2013.[56] Their study not only provides evidence of chilling effects, but also offers a research design that may be employed to study chilling effects in other online contexts.

However, the study had its limitations. First, the dataset in the Google study only included search term data though mid-December 2013. Without more recent data, it is unclear whether the effects tracked in the study had a permanent, or at least longer term, impact. Second, the authors obtained their data from Google Trends, which provides Google search data in "normalized" or adjusted format.[57] The search data is normalized in two ways. First, the data represents only a percentage of total Google searches for any given term.[58] Second, Google then "adjusts" the search data to render comparisons across regions more easily; these results are further "scaled to a range of 0 to 100".[59] This, the authors admitted, meant it was "harder to make projections" based on the findings of the study— such as resulting "economic outcomes"[60]— as without raw and unadjusted search data, it is difficult to measure, on a more granular and realistic level, how peoples' Google search activities were truly impacted and the resulting economic impact (*e.g.*, Google earns revenue through search-related ads, so a reduction in Google search inquiries may affect revenue and profit). A third limitation of the study was the lack of a genuine control group. The study examined trends before and after June 2013, but the there was no opportunity to control the PRISM/NSA revelations like a true experimental intervention.[61] A fourth limitation was the possibility that users were still searching for the same search terms but simply using an

55 Marthews & Tucker, *supra* note 25, at 5-9.

56 *Id.* at 3.

57 Marthews & Tucker, *supra* note 25, at 8.

58 Google Trends Help, *Where Trends Data Comes From*, https://support.google.com/trends/answer/4355213?hl=en&ref_topic=4365599 ("Google Trends analyzes a percentage of Google web searches to figure out how many searches were done over a certain period of time. For example, if you search for tea in Scotland in March of 2007, Trends analyzes a percentage of all searches for tea within the same time and location parameters.").

59 Google Trends Help, *How Trends Data is Adjusted*, https://support.google.com/trends/answer/4365533?hl=en&ref_topic=4365599 ("Google Trends adjusts search data to make comparisons between terms easier. Otherwise, places with the most search volume would always be ranked highest. To do this, each data point is divided by the total searches of the geography and time range it represents, to compare relative popularity. The resulting numbers are then scaled to a range of 0 to 100.").

60 Marthews & Tucker, *supra* note 25, at 8.

61 The authors note that they only have "quasi" controls: *Id.* at 6.

alternative search engine to Google (presumably one not expressly linked to the NSA's PRISM program).[62]

Despite these limits, however, the Marthews and Tucker *did* provide evidence of chilling effects in a concrete online context—search, though their findings are not unassailable. Sören Preibusch's more recent study employed Marthews and Tucker's design, primarily examining Bing search term trends and Tor usage data (as a proxy for users engaging in "privacy-enhancing" activities as Tor is browser designed to protect privacy and anonymity online) pre and post Snowden.[63] He found that while users' behavior did change immediately after the June 2013 revelations, those privacy behaviors "faded quickly".[64] Like Marthews and Tucker, Preibusch acknowledged important limitations— for example, his noted his use of Bing data likely "biased" his results and that his selection of data sources was "partly pragmatic" in this sense.[65] And also like Marthews and Tucker, his data set was temporally limited— only extending from May 2013 to January 2014.[66] In a slightly different but related 2013 study, Yoan Hermstrüwer and Stephan Dickert found little evidence of significant chilling effects associated with privacy and reputational risks of embarrassing online disclosures, leading them to conclude that "dystopian" concerns often expressed by privacy scholars, about chilling effects and the conforming impact surveillance, to be overstated.[67] Again, the researchers acknowledged a number of important "caveats" to their findings, most notably, were likely biased due to self-selection by participants who had already bound themselves to conforming behavior through informed study to be involved.[68]

62 *Id.* at 6-8.

63 Sören Preibusch, *Privacy Behaviors After Snowden*, 58:5 COMMUNICATIONS OF THE ACM 48-52 (MAY 2015).

64 *Id.* at 48, 55.

65 *Id.* at 55 ("My analysis of Web search behavior through Microsoft's Bing search engine may have introduced a bias impossible to quantify, should it exist.").

66 *Id.* at 48.

67 Yoan Hermstrüwer & Stephan Dickert, *Tearing the Veil of Privacy Law: An Experiment on Chilling Effects and the Right to be Forgotten* 22-23 (Preprints of the Max Planck Institute for Research on Collective Goods, No. 2013/15, 2013), http://www.econstor.eu/bitstream/10419/84983/1/757205445.pdf (an experimental study on chilling effects finding that risks of "networked publicity" (exposure online of users' embarrassing activities) did not affect users' "privacy valuations" nor "dampen" either "behavioral idiosyncrasies" or the "panoply of different behaviors" involved in the study; they conclude that concerns about surveillance related chilling and conforming effects may be "overstated").

68 *Id.* at 25 ("A second critique may be that, in our setting, networked publicity is a function of an endogenous choice, making causal inferences about the factors driving social norm compliance more difficult. Individuals may have self-selected into networked publicity because of their stronger inclination to comply with social norms.").

The study in this Article builds on the Marthews and Tucker pre/post Snowden design, but also aims to address some of the aforementioned limitations in these related studies. For example, the dataset employed will include data that starts earlier (January 2012) and extends later (August 2014), which is far more recent than data employed by Marthews and Tucker or Preibusch. Furthermore, the Wikipedia article traffic data employed is raw and unadjusted, providing a more accurate and granular understanding of any observed changes in data trends. To document how government surveillance has affected user behavior online, the case study's interrupted time series research design approaches the June 2013 revelations as the interrupting "exogenous shock" or "focusing event," and examines whether Wikipedia article traffic for certain topics (that reasonably raise privacy concerns for Internet users) decreased following those revelations.

D. HYPOTHESIS

This case study asks: Does the Wikipedia article traffic, for the privacy concerning topics tracked, decrease after the "exogenous shock" of widespread publicity surrounding the June 2013 revelations? A hypothesis based on chilling effects theory may be stated this way: Due to chilling effects caused by increased awareness of government surveillance online, Internet users will be less likely to view Wikipedia articles on topics that raise privacy-related concerns. In ultimately providing compelling evidence suggesting a NSA/PRISM surveillance related chilling effect, this study is among the first to do so using web traffic data (instead of survey responses or search) and the first to evidence the impact of surveillance chill not only on Wikipedia users but how people seek, and access, information and knowledge online more generally. The next section sets out this case study's research design and methodology, including its focus on Wikipedia.

III. METHOD AND DESIGN

A. WHY WIKIPEDIA TRAFFIC?

This case study focuses on English Wikipedia (i.e. articles with content in the English language) and traffic to specific Wikipedia articles as a means of exploring chilling effects online. Why Wikipedia? First, despite some skepticism as to its accuracy, Wikipedia is an influential resource for information and knowledge online. Over 50% of Internet users use Wikipedia as a source of information.[69] Over a third of Americans visit Wikipedia

69 Lee Rainie et al., *Wikipedia, Past and Present*, PEW INTERNET & AM. LIFE PROJECT SURV. (Jan. 13, 2013), http://www.pewinternet.org/files/old-media/Files/Reports/2011/PIP_Wikipedia.pdf.

annually making it one of the top ten most popular sites on the Internet, and in a study of college students, researchers Alison Head and Michael Eisenberg found 52% used Wikipedia "frequently."[70] In other words, if government surveillance is impacting or "chilling" users from accessing Wikipedia, then there are implications far beyond Wikipedia's function as an online encyclopedia. Indeed, researchers have used Wikipedia for a broad range of research, relating to both online and offline concerns, including theorizing and understanding peer-production,[71] mapping online knowledge and patterns of local knowledge production,[72] and investigating the subtle ways that popular information platforms like Wikipedia influence far more than just students or researchers seeking knowledge online.[73] These works all illustrate Wikipedia's importance beyond being a basic source of information, so a chilling effect on Wikipedia users would also threaten or negatively impact these other important uses and contributions of the site— if people were "chilled" or deterred en masse from using Wikipedia over time, it could no longer be used as an important focal point for such research.

Second, there is existing research suggesting media coverage can impact Wikipedia use. Research has shown not only that Wikipedia is illustrated and explored how media coverage and "breaking news events" impact Wikipedia editors and other collaborations on article content.[74] If Wikipedia editors and

70 Alison J. Head & Michael B. Eisenberg, *How Today's College Students Use Wikipedia For Course-Related Research*, 15:3 FIRST MONDAY (2010), http://firstmonday.org/article/view/2830/2476; Hilles, *supra* note 3, at 247.

71 *See, e.g.*, YOCHAI BENKLER, THE WEALTH OF NETWORKS: HOW SOCIAL PRODUCTION TRANSFORMS 70-74, 101-123, 287-294 (2006) (discussing Wikipedia in relation to a range of topics, including "networked information economy," the "economics of social production," and the nature of Internet culture); Yann Algan, Yochai Benkler, Mayo Fuster Morell, & Jérôme Hergueux, *Cooperation in a Peer Production Economy Experimental Evidence from Wikipedia*, WORKSHOP ON INFO. SYS. & ECON.(2013), https://www.parisschoolofeconomics.eu/IMG/pdf/hergueux_paper-2.pdf (using Wikipedia to study the social foundations of peer contributions and production).

72 *See, e.g.*, Mark Graham, Bernie Hogan, & Ralph K. Straumann, *Uneven Geographies of User-Generated Information: Patterns of Increasing Informational Poverty,* 104:4 ANNALS ASS'N AM. GEOGRAPHERS 746 (2014) (using Wikipedia to map patterns of global knowledge and information production).

73 *See, e.g.*, Mark Graham, *Internet Geographies: Data Shadows and Digital Divisions of Labour*, in SOCIETY AND THE INTERNET: HOW NETWORKS OF INFORMATION AND COMMUNICATION ARE CHANGING OUR LIVES 99-116 (Mark Graham & William H. Dutton, eds., 2014) (using Wikipedia to understand a "digital division" of labor in global information production); Mark Graham, *The Wikimedia Foundation and the Self-Governing Wikipedia Community: A Dynamic Relationship Under Constant Negotiation*, in CRITICAL POINT OF VIEW: A WIKIPEDIA READER (Geert Lovink & Nathaniel Tkacz, eds., 2011) (discussing elements of Wikipedia's governance structure, including how it is vulnerable to "chilling effects" and other regulatory problems).

74 Brian Keegan, *A History of Newswork on Wikipedia*, PROCEEDINGS OF THE 9TH INTERNATIONAL SYMPOSIUM ON OPEN COLLABORATION, ACM: NEW YORK (2013) (noting, among other things, how Wikipedia becomes a focal point for information seekers during

contributors respond to media coverage and significant news events, and impact the site and its users, it is reasonable to predict that the surveillance-related revelations may likewise have an impact or chilling effect as on Wikipedia users). In short, there is an existing empirical foundation that media coverage of an important story like government surveillance could impact Wikipedia and its users.

There are also methodological reasons for this case study's focus on Wikipedia. First, unlike Google Trends, Wikimedia Foundation provides a wealth of data on key elements of its site, including article traffic data, which can provide a more accurate picture as to any impact or chilling effects identified.[75] Second, Wikipedia, a "unique, online, collaborative encyclopedia,"[76] has over 500 million visitors per month, and its collaborative and peer-produced content is growing at a rate of 17,800 articles per day (as of May 2014, English Wikipedia content includes over 4.6 million articles).[77] In other words, Wikipedia is both a massively popular medium, but one that is also growing in content and scope. As such, any observed chilling effect would implicate a large number of Internet users (accessing Wikipedia) doing something wholly legal—accessing information and knowledge in an encyclopedia—and, arguably, such chilled or reduced use would run counter to these Wikipedia use and content trends.

Finally, the public policy impact of any observed Wikipedia chilling effects is also a consideration. Investigating "chilling effect" claims related to Wikipedia use has recently become a matter of important public interest, in light of the Wikimedia Foundation lawsuit alleging NSA surveillance has had a

breaking news events, both as a source of information and to understand the event and share information about it); Brian Keegan, *Emergent Social Roles in Wikipedia's Breaking News Collaborations*, *in* ROLES, TRUST, AND REPUTATION IN SOCIAL MEDIA KNOWLEDGE MARKETS 57-79 (Elisa Bertino, Sorin Adam Matei, eds., 2015) (reviewing literature exploring how Wikipedia covers news events, and the impact those events have on Wikipedia collaborative infrastructure and networks. This article also provides a brief overview of research examining the nature and structure of Wikipedia editor networks more generally); Brian C. Keegan, Darren Gergle , & Noshir Contractor, *Hot Off the Wiki: Structures and Dynamics of Wikipedia's Coverage of Breaking News Events*, 57(2) AMERICAN BEHAVIORAL SCIENTIST 595 (2013), http://abs.sagepub.com/content/57/5/595 (analyzes Wikipedia revision history data to explore the nature and structure of Wikipedia collaborative efforts in relation to breaking news events).

75 Wikipedia provides a wealth of information about its number of articles, editors, page views, etc, see *Growth Per Wikipedia Wiki*, https://stats.wikimedia.org/wikimedia/animations/growth/AnimationProjectsGrowthWp.html(last visited Nov. 17, 2015).

76 *See* Bar-Ilan & Aharony, *supra* note 3, at 243.

77 McIver & Brownstein, *supra* note 3, at 1; Hilles, *supra* note 3, at 245.

chilling effect on Wikipedia and its users.[78] This case study will test and explore these claims.

B. RESEARCH DESIGN AND DATA SELECTION

This case study uses an interrupted time series (ITS) design.[79] An ITS design uses a time series, which is a series of measurements or observations over time that is "interrupted" by some intervention or exogenous event. Such intervention divides the time series into two segments, resulting in measurements of time series before and after the intervening event. By "comparing" patterns in the time series data before and after the interruption, the study can assess the impact of an interrupting intervention or focusing event.[80] Specifically, this study will compare patterns in the data before and after the June 2013 revelations.

Furthermore, this study combines segmented regression analysis with its ITS design. Such combination offers a powerful means for exploring the effects of interventions, events, or policy changes as long as there is a "clearly identified time point of intervention."[81] In this case, the identified time point of intervention is June 2013 surveillance revelations. Segmented regression is useful because it allows one to compare changes in data levels and trends (like a reduction in views of Wikipedia articles over time) before and after an intervening event, while helping to isolate the impact of that event by controlling for other factors and variables.

Because of its capacity to visualize observed and analyzed data in a compelling way, ITS design has been applied to a range of fields[82] and is

78 *See* Wales & Tretikov, *supra* note 3. *See generally* Complaint, *supra* note 1 (Wikimedia Foundation is the lead complainant and, for the record, the only complainant in the lawsuit that provides accessible data that can be analyzed for the purposes of this study).

79 *See supra* note 27 (see works cited on ITS design).

80 CAMPBELL & STANLEY, *supra* note 27, at 37; Fok, Henry, & Allen, *supra* note 27, at 4; Mark & Reichardt, *supra* note 27, at 354-355; Penfold & Zhang, *supra* note 27, at S39-S40;Wagner et al., *supra* note 27, at 299.

81 Fok, Henry, & Allen, *supra* note 27, at 10 ("The [ITS design] is especially useful when there is a clearly identified time point of intervention or policy change.") [Fix pin cite; no pg 10 for this article]; Mark & Reichardt, *supra* note 27. at 354-355, 383 ("[I]nterrupted time-series designs can be among the most credible quasi-experimental designs."); Penfold & Zhang, *supra* note 27, at S38 (stating that ITS design is among the "strongest" where randomized and controlled experiments are not possible); Wagner et al., *supra* note 27, at 299 ("Interrupted time series [with segmented regression analysis] is the strongest, quasi-experimental design to evaluate longitudinal effects of such time-delimited interventions.").

82 Mylene Lagarde, *How to do (or not to do)… Assessing the Impact of a Policy Change with Routine Longitudinal Data*, 27 HEALTH POL'Y AND PLAN. 76, 76 (2011) (describing how "quasi-experimental" ITS designs, employing segmented regression, has been used in "various fields" including environmental studies, "financial economics," and "health policies"), http://heapol.oxfordjournals.org/content/27/1/76.full.pdf.

particularly popular among policy researchers.[83] It has also been used to explore the effects of laws, policing (including surveillance by law enforcement), and other regulatory actions.[84]

This case study uses data on English language Wikipedia article view counts from the online service stats.grok.se, a portal maintained by a Wikimedia Foundation member. This portal provides access to a range of Wikipedia analytics, stats, and data.[85] In particular, the portal aggregates Wikipedia article view data on a daily and monthly basis.[86] This data at stats.grok.se has been used in a range of research, including studies involving market trends, health information access, and social-political change.[87]

83 *See, e.g.*, Benjamin French & Patrick J. Heagerty, *Analysis of Longitudinal Data to Evaluate a Policy Change*, 27:24 STAT. MEDICINE 5005 (2008) (surveying different research designs and methods in policy change research); Lagarde, *supra* note 82, at 76 (describing in detail an ITS design that employs segmented regression as a simple but robust method to study policy impact and change); Wagner et al., *supra* note 27.

84 *See, e.g.*, Samuel Cameron, *The Economics of Crime Deterrence: A Survey of Theory and Evidence*, 41:2 KYKLOS 301, 314 (1988) (noting economists had begun using ITS designs, which then had long been used by criminologists); Daniel S. Nagin, *Criminal Deterrence Research at the Outset of the Twenty-First Century*, 23 CRIME AND JUST. 1, 8-12 (1998) (discussing a range of laws and police operations that have been using ITS designs); Lynn W. Phillips & Bobby J. Calder, *Evaluating Consumer Protection Laws: II. Promising Methods*, 14:1 J. CONSUMER AFFAIRS 9 (1980) (surveying literature on methods/research designs used to study consumer protection laws, including ITS). For some more recent examples, see Carl Bonander, Finn Nilson, & Ragnar Andersson, *The Effect of the Swedish Bicycle Helmet Law for Children: An Interrupted Time Series Study*, 51 J. SAFETY RES. 15 (2014) (used ITS design to explore the impact of a bicycle helmet law by examining inpatient data on injured cyclists before and after the law was enacted); Becky Briesacher, et al., *A Critical Review of Methods to Evaluate the Impact of FDA Regulatory Actions*, 22:9 PHARMACOEPIDEMIOLOGY AND DRUG SAFETY 986 (2013) (reviews a range of ITS design studies examining the impact of FDA regulatory actions often by exploring health data before and after the FDA action); Benjamin David Décary Hétu, *Police Operations 3.0: On the Impact and Policy Implications of Police Operations on the Warez Scene*, 6:3 POL'Y & INTERNET 315 (2014) (exploring the impact of police operations and crackdown on the "warez" (online piracy) scene with an ITS design that examined data on the output of different warez communities before and after five different police operations); Jeffrey T. Ward, Matt R. Nobles, Lonn Lanza-Kaduce, Lora M. Levett, & Rob Tillyer, *Caught in Their Own Speed Trap: The Intersection of Speed Enforcement Policy, Police Legitimacy, and Decision Acceptance*, 14:3 POLICE QUARTERLY 251 (2011)(using an ITS design to study the impact certain policy changes have on public opinion concerning the legitimacy police action, specifically, comparing speeding citation contestation rates before and after the introduction of an advertising campaign labeling the intervention city a "speed trap").

85 Stats.grok.se is maintained by Domas Mituzas, a Wikipedia developer, past Board of Trustee on the Wikimedia Foundation, and present member of its Advisory Board, see *Frequent Questions*, GROK. http://stats.grok.se/about (last visited Nov. 17, 2015).

86 *Id.*

87 *See, e.g.,* Michela Ferron & Paolo Massa, *WikiRevolutions: Wikipedia as a Lens for Studying the Real-Time Formation of Collective Memories of Revolutions*, 5 INT'L J. COMM. 1313 (2011) (examining Wikipedia as a "lens" through which to understand real-time social and political upheaval and change); Michaël R. Laurent & Tim J. Vickers, *Seeking Health Information Online:*

Like the Marthews and Tucker study, this case study uses a list of keywords the U.S. Department of Homeland Security use to track and monitor social media.[88] This list categorizes certain search terms in relation to a range of different issues such as "Health Concern," "Infrastructure Security," and "Terrorism." According to the DHS documents themselves, the list is meant to assist analysts to monitor social media to provide "situational awareness and establish a common operating picture."[89] Though the methodology for formulating the list is not well known, presumably they represent ideas or content people associate with "terrorism" and similar national security matters. Because of this, they are items that government officials may be interested in tracking online.[90]

Using governments' own keyword lists (for online monitoring purposes) to study government surveillance or censorship is not new.[91] Here, the DHS keywords provide a helpful basis of selecting Wikipedia articles for the study. To be clear, this keyword list is non-random and it is not chosen based on any assumption that the general public is aware of the list or the topics attached. In other words, this study does not assume that people are avoiding topics relating to these keywords due to the DHS' media monitoring program. Rather, the list is simply used as a means of methodological pragmatism. Similar to how the list was used in the MIT Google search trends study,[92] the DHS documents, and the keywords therein, are used to select Wikipedia

Does Wikipedia Matter? 16:4 J. AM. MED. INFORMATICS ASS'N 471 (2009)(using Wikipedia traffic data from stats.grok.se to study the relevance of Wikipedia to how people access to health information online); Helen Susannah Moat et al., *Quantifying Wikipedia Usage Patterns Before Stock Market Moves*, 3 SCI. REP. 1 (2013) (investigating Wikipedia article traffic and usage in relation to stock market changes).

88 The keyword list has been publicly available online since 2012, and was updated and re-posted by the DHS in 2013: U.S. DEP'T OF HOMELAND SEC., NATIONAL OPERATIONS CENTER MEDIA MONITORING CAPABILITY ANALYST'S DESKTOP BINDER (2011) [hereinafter ANALYST'S DESKTOP BINDER], https://epic.org/foia/epic-v-dhs-media-monitoring/Analyst-Desktop-Binder-REDACTED.pdf. This was later updated and posted online by the DHS. *See* U.S. DEP'T OF HOMELAND SEC., PRIVACY IMPACT ASSESSMENT FOR THE OFFICE OF OPERATIONS COORDINATION AND PLANNING (2013)[hereinafter PRIVACY IMPACT ASSESSMENT], https://www.dhs.gov/sites/default/files/publications/privacy/PIAs/privacy_pia_ops_NOC%20MMC%20Update_April2013.pdf

89 PRIVACY IMPACT ASSESSMENT (2013), *supra* note 88, at 23 (Appendix B); Marthews & Tucker, *supra* note 25, at 3-4.

90 Marthews & Tucker, *supra* note 25, at 6.

91 Jedidiah R. Crandall & Masashi Crete-Nishihata et al., *Chat Program Censorship and Surveillance in China: Tracking TOM-Skype and Sina UC*, 18:7 FIRST MONDAY (2013), http://firstmonday.org/ojs/index.php/fm/article/view/4628/3727; Jeffrey Knockel, Jedidah Crandall, & Jared Saia, *Three Researchers, Five Conjectures: An Empirical Analysis of Tom-Skype Censorship and Surveillance*, 16:4 FOCI'11: USENIX WORKSHOP ON FREE AND OPEN COMM. ON INTERNET (2011), https://www.cs.unm.edu/~crandall/foci11knockel.pdf.

92 Marthews & Tucker, *supra* note 25, at 3-4.

articles that reasonably represent the sort of articles that users may be chilled from accessing in light of government surveillance.[93]

This case study selected forty-eight Wikipedia articles that corresponded with the DHS keywords listed as relating to "terrorism."[94] The full list of the keywords used— which include terms such as "dirty bomb," "suicide attack", "nuclear enrichment", and "eco-terrorism"— and the corresponding English language Wikipedia articles for which Wikipedia article "page view" counts were collected via stats.grok.se can be found at **Appendix D**.[95]

The keywords relating to "terrorism" were used to select the Wikipedia articles because the U.S. government cited terrorism as a key justification for PRISM and NSA surveillance. Moreover, much of the media and news coverage framed the revelations around terrorism and national security.[96] Wikipedia articles coinciding with these terrorism-related topic keywords may include the kind of information or content users may avoid accessing in light of potential government surveillance. This study aggregated Wikipedia article traffic (or view counts) on a monthly basis for the forty-eight Wikipedia articles over a 32 month period, from the beginning of January 2012 to the end of August 2014. Those forty-eight Wikipedia articles corresponded with all DHS keywords listed in the "terrorism" category.[97]

93 For example, if the government surveillance is focusing on terrorism online, people may have privacy concerns about accessing terrorism-related information online, and are thus "chilled" or deterred from accessing.

94 PRIVACY IMPACT ASSESSMENT (2013), *supra* note 88, at 27. Locating Wikipedia articles coinciding with each keyword was done manually; this was a rather simple exercise as there was a Wikipedia article that corresponded perfectly with the vast majority of keywords in the "terrorism" DHS keyword category. The few discrepancies were these: the Wikipedia article "environmental terrorism" was used for the keyword "environmental terrorist"; the keyword "target" was excluded as they were too many potentially corresponding Wikipedia articles; the Wikipedia article "political radicalism" was used for the DHS keyword "radicalism" (there were too many potentially corresponding Wikipedia articles); the keyword "enriched" was excluded as it was redundant with the included Wikipedia article / DHS keyword "nuclear enrichment"; there were also no Wikipedia articles corresponding with DHS keywords "weapons cache," "suspicious substance," "plot," and "homegrown." Wikipedia articles corresponding with the remaining 48 DHS "terrorism" related keywords were all included in the study.

95 For clarity, the raw Wikipedia article "Page View" statistics track total views or loads of the Wikipedia articles or pages in question, not unique visitors, see *Pageview Statistics*, Wikipedia, https://en.wikipedia.org/wiki/Wikipedia:Pageview_statistics (last updated July 8, 2015).

96 Qin, *supra* note 44, at 178 (finding that a predominant "framing" in traditional news media coverage of the Snowden surveillance disclosures focused on national security terrorism, along with international relations).

97 PRIVACY IMPACT ASSESSMENT (2013), *supra* note 88, at 27. The findings in this study primarily concern the English speaking world, as only English Wikipedia article view counts are tracked in the Wikipedia data. Locating Wikipedia articles coinciding with each keyword

Although forty-eight is not an extraordinarily large sample size, the Wikipedia traffic attracted by these articles represents over 81 million total article page views over the course of the study. This means that the potential number of Internet users tracked in the study could be in several millions.[98] Moreover, to ensure the sample of forty-eight articles could be generalized to a wider sample of content (both terrorism-related and other topics that may raise privacy concerns), the study used crowdsourcing following the approach of Marthews and Tucker.[99]

This study used crowdsourcing to have independent respondents individually evaluate the privacy value of the topics in question.[100] Crowdsourcing involves completing certain tasks with the assistance of larger pools of online users or "crowds"—recruited through online services like Amazon's Mechnical Turk (MTurk)—and has become a common technique for researchers to evaluate research instruments and other measures for privacy or privacy-related concerns.[101] MTurk is an "open" online crowdsourcing platform founded in 2005 that provides a means for "task creation", "recruitment", "compensation and data collection."[102] Several studies summarized and documented MTurk's advantages for survey,

was done manually; the vast majority of keywords in the "terrorism" DHS category had a coinciding Wikipedia article.

98 Thus, though the selection of the forty-eight English Wikipedia articles was not random (there is no sampling frame for all terrorism-related Wikipedia articles), the data clearly indicates these articles represent a substantial number of Wikipedia users. Though a precise number cannot be estimated (the Wikipedia data tracks "Page View" statistics, that is, total views or loads of the Wikipedia articles or pages, not unique visitors, see *Pageview Statistics*, Wikipedia, https://en.wikipedia.org/wiki/Wikipedia:Pageview_statistics (last updated July 8, 2015). The data arguably still involves a large number of Internet users— many millions.

99 Marthews and Tucker similarly recruited independent "raters" to evaluate the privacy value of Google search terms in their study: Marthews & Tucker, *supra* note 25, at 3-5.

100 *Id.*

101 *See, e.g.*, Berker Agir, Jean-Paul Calbimonte, & Karl Aberer, *Semantic and Sensitivity Aware Location Privacy Protection for the Internet of Things*, PRIVACY ONLINE: WORKSHOP ON SOCIETY, PRIVACY AND SEMANTIC WEB PRIVON 2014 (2014), http://ceur-ws.org/Vol-1316/privon2014_paper5.pdf; Margherita Bonetto et al., *Privacy in Mini-drone Based Video Surveillance*, WORKSHOP ON DE-IDENTIFICATION FOR PRIVACY PROTECTION MULTIMEDIA (2015), http://infoscience.epfl.ch/record/206109; Pavel Korshunov et al., *Crowdsourcing-based Evaluation of Privacy in HDR images*, SPIE PHOTONICS EUROPE (2014), http://proceedings.spiedigitallibrary.org/proceeding.aspx?articleid=1873752; Pavel Korshunov et al., *Framework For Objective Evaluation of Privacy Filters*, SPIE OPTICAL ENGINEERING + APPLICATIONS (2013), http://proceedings.spiedigitallibrary.org/proceeding.aspx?articleid=1744325; Jialiu Lin et al., *Expectation and Purpose: Understanding Users' Mental Models of Mobile App Privacy Through Crowdsourcing*, PROC. 2012 ACM CONF. ON UBIQUITOUS COMPUTING (2012), http://dl.acm.org/citation.cfm?id=2370290.

102 Michael Buhrmester, Tracy Kwang, and Samuel Gosling, *Amazon's Mechanical Turk: A New Source of Inexpensive, Yet High Quality, Data?*, 6:1 PERSP. ON PSYCHOLOGICAL SCI.3, 3 (2011), http://pps.sagepub.com/content/6/1/3.abstract.

experimental, and other related research. Paolacci and Chandler recently concluded, after extensively canvassing existing evidence, that researchers may use MTurk for "virtually any study that is feasible to conduct online."[103] Indeed, the MTurk service has been validated as a tool for a range of research, including research on behavioral economics, and decision-making, collective behavior experiments, linguistic and cognitive psychological experiments, and, importantly for our purposes, conducting survey research.[104] Samples recruited with MTurk have been found to be "at least as diverse as traditional subject pools" in terms of the general U.S. population and "relatively representative" of the U.S. Internet using population.[105]

A total of 415 independent Internet users participated in the crowdsourcing project through MTurk, and they rated each of the forty-eight topics, with which the Wikipedia articles in the data set corresponded. The questions were designed to explore the likelihood that the topics would raise privacy-related concerns for Internet users. To minimize self-selection and response bias (a limitation difficult to avoid in non-random sampling), the brief questionnaires were described as merely an "Online Information Study" to potential MTurk participants.

The respondents recruited for the evaluations were similar to other MTurk participant pools that are "relatively representative of the population of U.S. Internet users." However, the respondents for this study were younger, more educated, had slightly lower incomes than the broader U.S. Internet population, and slightly more male than female with 56% of respondents male and 44% female.[106] The respondents were also highly likely to use "websites and other online resources" for information more generally (83.8% were "very likely" and another 15% "somewhat likely") and, in particular, to "stay informed about current events" (73.5% "very likely" and another 22.9% "somewhat likely"). Respondents were asked to indicate on a scale of 1 to 5 (1 being very unlikely and 5 being very likely): how likely they thought they would be in trouble if the U.S. Government found out that they accessed information about the topic in question (Government Trouble Rating); how "privacy-

103 Gabriele Paolacci & Jesse Chandler, *Inside the Turk: Understanding Mechanical Turk as a Participant Pool*, 23:3 CURRENT DIRECTIONS PSYCHOL. SCI. 184, 186 (2014), http://cdp.sagepub.com/content/23/3/184.abstract.

104 Matthew J.C. Crump, John V. McDonnell, & Todd M. Gureckis, *Evaluating Amazon's Mechanical Turk as a Tool for Experimental Behavioral Research*, 8:3 PLOS ONE e57410, e57410 (2013), http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0057410

105 Gabriele Paolacci, Jesse Chandler, & Panagiotis G. Ipeirotis, *Running Experiments on Amazon Mechanical Turk*, 5:5 JUDGMENT AND DECISION MAKING 411, 411-412 (2010), http://sjdm.org/~baron/journal/10/10630a/jdm10630a.pdf; Panagiotis G. Ipeirotis, *Turker Demographics vs. Internet Demographics*, COMPUTER SCIENTIST BUS. SCH. (2009), http://www.behind-the-enemy-lines.com/2009/03/turker-demographics-vs-internet.html.

106 Paolacci, Chandler, & Ipeirotis, *id.* at 412.

sensitive" they viewed each topic as (in this case, 5 being highly sensitive and 1 not at all) (Privacy-Sensitive Rating); how likely they would be to delete the browser history on their computer after accessing information about the topic; and how likely they would avoid viewing or accessing information on the topic if they knew the Government was monitoring peoples' activities online (Avoidance Rating).[107]

The results are set out in the table at **Appendix C.** On balance, the results from the first three categories suggest that the topics raised notable privacy concerns for respondents. The results do not suggest, however, that any one category raised overly strong concerns. This is not entirely surprising as there is no particular reason why someone would expect to be in "trouble" with the government for simply accessing information online when such access is a legal activity. The rating scores in response to the *fourth* category are, however, noteworthy—things change if people are aware of government surveillance. This is apparent from the higher "Avoidance" rating of 2.62, which suggests that respondents were overall more likely to avoid the topics in question if they *knew* the government was monitoring online activities. In short, the ratings suggest that the topics of the forty-eight Wikipedia articles raise privacy concerns for Internet users, particularly when people suspect the government is monitoring them, which may lead them to avoid or be chilled from accessing that information.

C. METHOD OF ANALYSIS

A strength of ITS design is that there are "multiple" assessments or measures before and after the event or intervention in the time series; such multiplicity controls for changes in level and secular trends in the data and increase the robustness of results.[108] This case study uses Wikipedia article view counts or traffic data to create a time series over a 32-month study period from January 2012 to August 2014 (n=32), with the "interruption" or intervening event dividing the time series into two segments: before and after the June 2013 revelations. Two empirical approaches are used to analyze the interrupted time series. The first is a simple comparison of the mean number of views for all the Wikipedia articles in the dataset before and after June 2013. If there is a chilling effect due to surveillance revelations in June 2013, the average or mean number of views for the forty-eight Wikipedia articles should be lower for months following June 2013 than that of the months before. The

107 This is not a standard scale, but one developed for this case study. For methodological consistency, these questions were designed to track ratings categories used by Marthews and Tucker: Marthews & Tucker, *supra* note 25, at 33 (Table 15).

108 CAMPBELL & STANLEY, *supra* note 27, at 37; Fok, Henry, & Allen, *supra* note 27, at 7; Lagarde, *supra* note 82; Penfold & Zhang, *supra* note 27, at S39; Wagner et al., *supra* note 27, at 308.

second is a model-based empirical analysis. That is, segmented regression of an interrupted time series, which is the recommended method of analysis for ITS designs.[109] Health economist Mylene Lagarde recently set out and analyzed this method comprehensively[110] and provided an equation that expresses the specification for the regression analysis:

$$Y_t = \beta_0 + \beta_1 * \text{time} + \beta_2 * \text{intervention} + \beta_3 * \text{postslope} + \varepsilon_t$$ [111]

The ITS design controls for secular trends, or the long-term and non-periodic trends in the data.[112] To strengthen the robustness and validity of results, however, additional controls can be included in the model, and, where appropriate, auto-correlation can be corrected.[113] Here, although a true control group was not possible,[114] to increase the robustness of the analysis, a further control variable was added that includes monthly raw aggregate total view counts for all English Wikipedia articles on all platforms (desktop and mobile).[115] This was done to control for broader use trends in Wikipedia over the course of the thirty-two months, and isolate the impact that the June 2013 revelations had on the forty-eight Wikipedia articles in the case study.[116] Again,

109 Penfold & Zhang, *supra* note 27, at S41-42; Wagner et al., *supra* note 27, at 299.

110 Lagarde, *supra* note 82, at 79-80.

111 In this case study, Y_t the "outcome" or dependent variable is the raw aggregate total of Wikipedia article views (or 'view count') for the 48 articles in the study. The time variable includes 32 time points in the time series, representing each of the 32 months in the time series dataset from January 2012 to August 2014, which is the period of study. So, in this time series dataset, the "outcome" or dependent variable is the aggregate views of all forty-eight Wikipedia articles totaled on a monthly basis, for each of the 32 months. For greater clarity, in this model, β_0 captures the baseline level of the outcome variable at time 0— here, that would be the expected total views for all 48 articles in the dataset at the beginning of the study; β_1 estimates the secular trend or growth rate in the total number of views for the 48 Wikipedia articles, independently from the "intervention" or intervening event (the June 2013 surveillance revelations); β_2 estimates the immediate impact of the "intervention" or the exogenous shock of PRISM/NSA surveillance publicity in June 2013, by reflecting the change in the "level" or the total number of views for the Wikipedia articles immediately after the June 2013 events; and, finally, β_3 reflects any change in the trend of the data; that is, any growth or decline in total views for the 48 Wikipedia articles on a month-to-month basis, after the intervention: Lagarde, *supra* note 82, at 79-80.

112 Lagarde, *supra* note 82, at 79.

113 Lagarde, *supra* note 82, at 79, 81; Mark & Reichardt, *supra* note 27, at 385; Penfold & Zhang, *supra* note 27, at S42; Wagner et al., *supra* note 27, at 305.

114 Online surveillance potentially affects everyone, and there was no opportunity, before the June 2013 revelations to isolate a control group.

115 As previously noted, Wikimedia provides a wealth of information about: *Page Views for Wikipedia, Both Sits, Raw Data*, WIKIMEDIA (Nov. 11, 2015) http://stats.wikimedia.org/EN/TablesPageViewsMonthlyOriginalCombined.htm

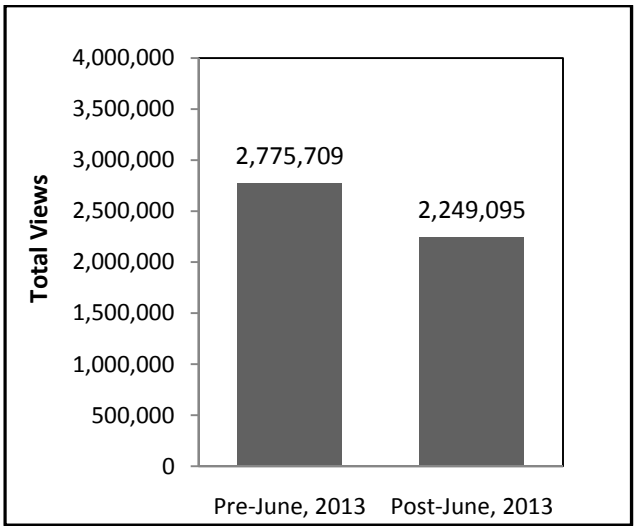
116 The segmented regression analysis was performed using the statistical software package Stata and auto-correlation is controlled for using the Prais-Winsten method where

a prediction based on chilling effects theory is that there will be a decrease in the total views of the forty-eight Wikipedia articles after June 2013. In addition to an immediate drop, if any chilling effects are more substantial and long-term the overall long-term trend in the data may also be impacted (e.g., a change from a gradual increase in the number of article views from month to month to a monthly reduction in total views).

IV. NON-MODEL EMPIRICAL FINDINGS

The results discussed in this section are "non-model" empirical findings, that is, these findings do not rely upon a statistical (regression) model. Instead, a more basic method of analysis is used whereby the average number of Wikipedia article views before and after the "focusing event" of June 2013 is compared. A lesser average number of views after June 2013 would be consistent with a chilling effect. Here, those mean total article views, for all Wikipedia articles in the study, for the months before and after June 2013 (see **Figure B**).

Figure B: Average monthly view counts, Pre and Post June, 2013
The reduction after the June 2013 surveillance revelations may suggest a chilling effect



The difference in mean values is notable—a reduction of 526,614 in the average monthly views for the article after June 2013, which represents

necessary: Lagarde, *supra* note 82, at 79 (recommending controlling for auto-correlation when employing this statistical analysis). See similar recommendations in: GEORGE G. JUDGE ET AL., INTRODUCTION TO THE THEORY AND PRACTICE OF ECONOMETRICS (1985).

approximately a 19.5% drop in article view counts. This is more than mean differences found in the Google search terms study before and after June 2013.[117] Moreover, this difference or reduction in average monthly article views before and after June 2013 is both large and highly statistically significant at the 99% confidence level.[118] This by itself offers some evidence of a chilling effect. Of course, there are alternative explanations for these results. One possible explanation may be that overall Wikipedia traffic (and thus, all Wikipedia article view counts) decreased after June 2013 for other reasons. Perhaps people are using Wikipedia less and less and this data is simply reflecting this overall declining trend unrelated to any surveillance revelations. So, while these findings are intriguing, a model-based empirical analysis is required to control for such variables as the overall trends in the data and to arrive at more robust empirical results. Statistical regression models, used in the next section may control for additional variables such as overall trends in Wikipedia article view traffic.

V. MODEL-BASED EMPIRICAL FINDINGS

As noted earlier, the "outcome" or dependent variable in this analysis represents the raw aggregate total view counts per month for all Wikipedia articles in the data set. The method of a segmented regression analysis of an interrupted time series data set ("interrupted" by the June2013 PRISM surveillance revelations) demonstrates the impact of these revelations. Two sets of results are reported here. Analysis was conducted using Stata statistical software.[119]

A. FIRST SET OF RESULTS

The first set of results is represented in the table at **Appendix A.** Interestingly, the results indicate there was a reduction of 853,586 views immediately following the June 2013 revelations, which is a large, sudden, and statistically significant drop in the total view counts for the forty-eight Wikipedia articles.[120] The total article views as of May 2013 is 2,960,778 views,

117 But *cf.*, Marthews & Tucker, *supra* note 25, at 13-14.

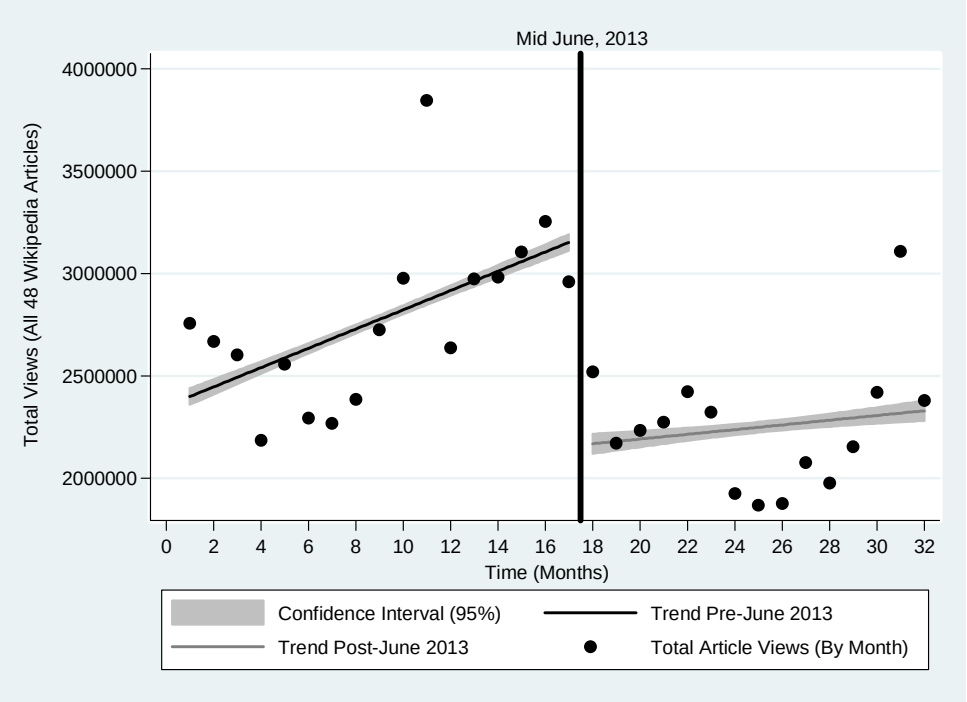
118 The Cohen's *d* value was 1.3286.

119 Version 11.1.

120 There is little consensus for the appropriate method to measure effect size for single group ITS designs like the one used for this case study: Larry Hedges, James Pustejovsky, & William Shadish, *A Standardized Mean Difference Effect Size for Single Case Designs*, 3:3 RES. SYNTHESIS METHODS 224, 225 (2012). The most common method in "treatment" studies is the percentage of non-overlapping data (PND), which here is clearly above the 80% threshold for a "large" effect size, see generally Thomas E. Scruggs & Margo A. Mastropieri, *How to Summarize Single-Participant Research: Ideas and Applications*, 9:4 EXCEPTIONALITY 227 (2001) (proposing the use of non-overlapping data metric for summarizing single participant research). However, model diagnostics identified two influential outlier data points, the first

meaning this decline represents an immediate drop off of almost 30% of total views overall. However, the results also indicate that there was no statistically significant change in the secular (or overall long-term) trend in the data. In short, because of the large drop in total view counts for the forty-eight Wikipedia articles, the data supports the existence of an immediate and substantial chilling effect following the June 2013 surveillance revelations. This decrease may be observed in the following graphic visualization in **Figure C**, below, which includes a scatter plot of the data points in the set and a trend line based on the fitted results produced by the regression analysis:

Figure C: First Results: Pre/Post June 2013 Article View Trends
The sudden drop, and flatter trend or slope in the data, after June 2013 surveillance revelations consistent with a chilling effect



In this graph, the large and statistically significant immediate drop (−853,585 page views) over the course of June 2013 can be seen, with the trend line (regression/line of best fit) substantially lower immediately after June, 2013, compared to the trend in the data before June. Also, there was no

outlier concerned view counts for the Wikipedia articles in the data set in November 2012 (Cooks D value = 0.1286922), and the other was for view counts in July 2014 (Cooks D value = 0.3244882). Both of these are extreme values and are visible from the visualization in **Figure C**.

statistically significant change in the secular trend in the data, as the slopes in the data before and after June 2013 are comparable: in each, the trend in view counts for the sample is modestly increasing overall.

Though there was not a statistically significant change in the trend of the data, the graph still suggests something more than an ephemeral chilling effect that dissipates quickly. Rather the data suggests a lasting impact on total article views. For example, the total article views as of August 2014 (month 32) is still lower than the views in April and May 2013 (months 15 and 16), the months prior to the PRISM revelations. The results also suggest that the chilling effect did not influence the long-term trend in the data that increased monthly. Though the number of views dropped off after June, 2013, the trend in the data still increased until August 2014 at a modest but apparent rate on a month-to-month basis.

In sum, the results are consistent with a sharp immediate chilling effect, possibly with a lasting impact on total views. However, the rising secular trend in the Wikipedia article traffic is inconsistent with a significant long term chilling effect.

B. OUTLIERS: THE 'EXOGENOUS SHOCK' OF WAR

Two outliers are clearly apparent in the data. The first is at month 11 (November 2012) and the second is at month 31 (July 2014). The view counts for the forty-eight Wikipedia articles in the data skyrocketed in these months, far beyond any other months before and after, clearly out of step with other data points. In November 2012, the total views dramatically and temporarily increased to approach almost 4,000,000 total views. In July 2014, total views exponentially increased far beyond previous or subsequent months. Model diagnostics confirm that these are highly influential outliers with extreme values.[121]

121 Best practices for dealing with outliers in cases like this were observed—the technique used to identify the "influential" outlier should be indicated (here, Cooks D), deletion used as a method to address the outlier, and results are reported with and without the outlier data. *See* Herman Aguinis, Ryan K. Gottfredson, & Harry Joo, *Best-Practice Recommendations for Defining, Identifying, and Handling Outliers*, ORGANIZATIONAL RES. METHODS 8, 20-23 (2014), http://orm.sagepub.com/content/early/2013/01/11/1094428112470848.abstract (techniques for identifying outliers should be indicated; Cooks D is noted (at 8 and 21) as an appropriate "technique" to identify an outlier's influence globally in a regression (as here); also the authors state (at 22) that influential outliers can be dealt with through deletion but "emphasize the importance of reporting the results with and without the chosen handling technique, which includes providing an explanation for any differences in results because the mere presence of influential outliers causes a dilemma in determining proper inference about a population based on a sample..."). These guidelines were, as noted, employed. The Cooks D value of 0.1286922 for the November 2012 view count and 0.3244882 for July 2014, are both extreme values.

What happened during November 2012 and July 2014 that caused the total view counts in the sample to suddenly skyrocket? War and conflict in the Middle East are likely the cause. In November 2012, Israel launched "Operation Pillar of Defense," an eight day Israeli Defense Force (IDF) operation in Gaza in response to rocket attacks launched by the Palestinian militia group, Hamas, into southern Israel.[122] The operation officially began on November 14, 2012 and ended on November 21, 2012, with an Egypt-brokered ceasefire. In July 2014, Israel launched "Operation Protective Edge," which is an IDF operation in Gaza against Hamas.[123] This operation ended after fifty days with widespread media coverage of the thousands of rockets fired from Gaza into Israel, and the likewise several thousand strikes, many by IDF air force, on Hamas targets in Gaza.[124]

These two high profile conflicts coincide with a dramatic and anomalous increase in the view counts during those months for the Wikipedia article on "Hamas" in the dataset. Examining more closely the view counts for the Hamas article over the 32 months in the data set, the "Hamas" Wikipedia article view count was 928,533 for November 2012, and then 1,220,490 for July 2014, which are far beyond the mean number of view counts for the article across all months in the study (134,574 monthly views). If we exclude these two outlier months, the contrast between the view counts for the Hamas Wikipedia article during those two months and other months in the dataset is even starker, with the mean being 71,912.[125] It can be inferred that the media

122 For a "timeline" to the conflict and the IDF operation against Hamas, see *TIMELINE: Israel Launches Operation Pillar of Defense Amid Gaza Escalation*, HAARETZ (Nov. 20, 2012), http://www.haaretz.com/news/diplomacy-defense/timeline-israel-launches-operation-pillar-of-defense-amid-gaza-escalation.premium-1.479284. *See also Q&A: Israel-Gaza Violence*, BBC NEWS (Nov. 22, 2012), http://www.bbc.com/news/world-middle-east-28439404.

123 Information about the operation is available in this Jerusalem Post article: Ben Hartman, *Fifty Days of Israel's Gaza Operation, Protective Edge – by the Numbers*, JERUSALEM POST (Aug. 28, 2014), http://www.jpost.com/Operation-Protective-Edge/50-days-of-Israels-Gaza-operation-Protective-Edge-by-the-numbers-372574; *Gaza Crisis: Toll of Operations in Gaza*, BBC NEWS (Sep. 1, 2014), http://www.bbc.com/news/world-middle-east-20388298.

124 Amos Harel, *At the Crossroads of a Gaza Ground Operation*, HAARETZ (Jul. 12, 2014), http://www.haaretz.com/news/diplomacy-defense/.premium-1.604601("Hamas and Israel are waging an image battle. Their moves are the subject of constant media coverage, and, more than in the past, they are using information and photos from civilians, through smart phones and social media."). In fact, the widespread media coverage of the Gaza conflict in 2012 led to a dramatic increase in social media activity during the 2012 conflict: Thomas Zeitzoff, *Does Social Media Influence Conflict? Evidence from the 2012 Gaza Conflict* (SSRN, Working Paper 13, 2012), http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2407804 (noting that "international interest" in the Israeli-Palestinian conflict "led to multiple, competing news organizations covering the 2012 Gaza Conflict").

125 This is confirmed by the *z*-scores for those two data points (3.01 and 4.11, respectively). Both are outlier values. *See generally* PETER H. WESTFALL & KEVIN S. S. HENNING, UNDERSTANDING ADVANCED STATISTICAL METHODS 247 (2013) (noting the

coverage of these two conflicts involving Israel and Hamas in Gaza led to a dramatic increase in Internet users seeking information about Hamas on English Wikipedia. This conclusion is supported by the fact that view counts for the Wikipedia article "Palestinian Liberation Organization" also increased in those same months.[126] It is also consistent with the findings of Zeitzoff, Kelly, and Lotan who have found that major conflicts, including the 2012 Gaza conflict, drew "significantly higher levels" of activity on the social media platform Twitter.[127] The two influential outliers relating to the "Hamas" Wikipedia article are incorporated in the second set of results.

C. SECOND SET OF RESULTS – A LASTING CHILLING EFFECT?

Consistent with best practices for dealing with outliers,[128] results including the outlier "Hamas" Wikipedia article data were reported above. A second set of results from the analysis, which excludes the outlier data concerning the Hamas article, is presented here and set out in the table at **Appendix B**. Removing the outliers led to new findings.[129] Similar to the first reported results, there was a sudden and statistically significant decrease in view counts following the June 2013 revelations: an immediate drop of 540,318 total views. Using the total article views as of May 2013 (2,960,778), this decrease represents an immediate drop off of just under 20%. This suggests that the revelations in June 2013 caused, or at least is consistent with, a chilling effect or a sharp and sudden decrease in traffic.

More importantly, however, is that after June 2013, there is not only a large and immediate drop in views but also a statistically significant change in the overall trend or direction in the month-to-month total views of the Wikipedia articles. Rather than trending upwards or increasing on a monthly basis, the trend after June 2013 has completely changed. Due to the statistically significant decrease of 63,593.4 monthly views, the overall data trend has shifted an increase of 30,367.3 views per month to a decrease of 33,226.1 per

"rule of thumb" that an observation with a z-score greater than +3.0 or less than -3.0 is typically considered an outlier).

126 However, these increases although noticeable in the data were not so extreme as to constitute outlier observations. The PLO Wikipedia article view count for November 2012 had a z-score of 3.0 while for July, 2014, it was 2.61. Neither are outliers. For explanation of the usual "rule of thumb" for z-scores and outliers, see *id.* at 247.

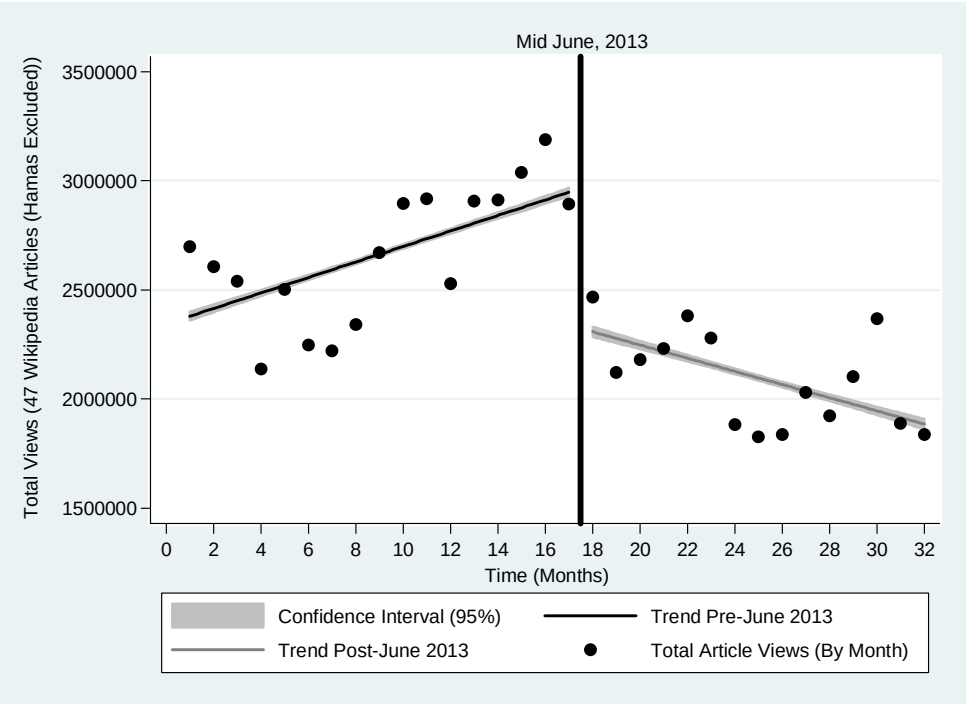
127 Thomas Zeitzoff, John Kelly, & Gilad Lotan, *Using Social Media to Measure Foreign Policy Dynamics: An Empirical Analysis of the Iranian-Israel Confrontation (2012-13),* 1:16 J. PEACE RES. 1,2,5 (2015) (among other things, focusing on social media data obtained from Twitter to track foreign policy discussions across languages online).

128 Aguinis et al., *supra* note 121.

129 The second set of results set out in **Figure D** were also corrected for auto-correlation using the Prais-Winsten method. For a discussion of the "importance" of controlling for auto-correlation in ITS designs using generalized least squares estimators like the Prais-Winsten method to correct see: Lagarde, *supra* note 82, at 79.

month. This is important. It means that the NSA/PRISM surveillance revelations, covered by media in June 2013, are associated in the findings not only with a sudden chilling effect but also a longer term, possibly even permanent, decrease in web traffic to the Wikipedia pages studied. This indicates a possible chill. **Figure D** illustrates this trend**:**

Figure D: Pre/Post June 2013 Trends (Outliers Excluded)
The sudden drop in views, and shift in trend from increasing monthly views over time to decreasing after June 2013, is consistent with a significant and long-term chilling effect



Here, the increased predictive strength of the model is apparent from the narrower confidence interval for regression/trend lines in both segments of the graph. The shifting trend of the data, which in this case is a sudden and immediate drop, is particularly consistent with a chilling effect arising from June 2013 revelations. If the outlier data relating to Hamas view counts is excluded, the decline in page views is less sudden (e.g. 20% immediate drop off if the Hamas data are excluded compared to the 30% drop off in the Hamas data remains in the study). However, regardless of whether the Hamas data is included, there is still a substantial and statistically significant decrease.

Moreover, there is a change in the overall trend in the data.[130] Before June 2013, total views of the Wikipedia articles in the dataset are slowly increasing month to month. They are clearly on the rise, at least until June 2013. After that month, however, with the widespread "exogenous shock" of publicity surrounding the PRISM/NSA surveillance revelations, there is a change in the "slope" or data trend. Without the outlier "Hamas" view counts in July 2014, the total views are on a downward path.

In sum, the visualization of data shows empirical evidence that is consistent with a long-term chilling effect due to the PRISM surveillance revelations, which is not only associated with an immediate drop in views but also a long-term chill on accessing these Wikipedia articles, as users accessed information on these topics less and less frequently.

D. FINAL RESULTS WITH COMPARATOR / QUASI-CONTROL GROUP

This section presents a final set of results, visualized, to strengthen the chilling effects inference from these findings, that is, the reduction in article views after the June 2013 revelations are a result of Wikipedia users' surveillance-related privacy concerns, leading to chilling effects. Two main steps were taken to strengthen this inference in these final results. First, to focus on Wikipedia article content most likely to raise privacy concerns for users, only the 31 articles with the highest combined privacy ratings (from the MTurk privacy evaluation) were included.[131] Second, a quasi-control[132] group of Wikipedia articles was added to the analysis. In a classic controlled experiment, a control group is randomly selected from the same population or sampling frame as the experimental group.[133] The design's logic is that if you draw from an identical or very similar sampling pool, the only significant difference between the testing and the control group, is the latter is not exposed to the intervention or treatment; therefore, if the treatment group is impacted while the control group is not, this strengthens the inference that the treatment or intervention caused any observed impact or intervention

130 Again, using percentage of non-overlapping data (PND) method to determine effect size, here the "intervention" in June 2013 clearly has a PND value of over 80% for a very large effect size. *See* Scruggs & Mastropieri, *supra* note 120, at 227.

131 This left 31 Wikipedia articles. The articles included can be viewed in **Appendix E.** Of the original 47 articles (48 minus Hamas), the median of the combined privacy score was 2; so anything below the media was removed to focus on those articles that should raise the most serious privacy concerns.

132 The control group is only "quasi" as there was no opportunity to isolate a group of Wikipedia users, before June 2013 revelations, not exposed to surveillance related concerns. This is because online surveillance potentially affects everyone.

133 *See* NOREEN L. CHANNELS, SOCIAL SCIENCE METHODS IN THE LEGAL PROCESS 58-60 (1985) (introducing experimental design).

effects.[134] Though true experiments are rarely found outside laboratories because they require highly controlled settings,[135] employing quasi-experimental features in research designs like ITS—such as employing a control group—helps strengthen findings and results.[136] As with experimental designs, a control group employed in an ITS design is ideally identical or very similar to the "experimental" group—if possible drawn from the same population—but would not "experience" the intervention.[137] Results for both the "testing" group (here, the terrorism-related Wikipedia articles) and the control group are compared to better understand any "intervention" impact associated with the June 2013 revelations.[138]

To create a quasi-control group as similar as possible to the terrorism-related Wikipedia articles in this study, a grouping of security-related Wikipedia articles was created using the category of "DHS and Other Agencies" homeland security related keywords from the same 2013 DHS document.[139] Logic of this design choice is straightforward. First, while using identical set of Wikipedia articles for the control group is impossible, terrorism and domestic security agencies are very closely related content and likely attract similar readers and Wikipedia users (thus rendering the article group and quasi-control

134 *Id.* at 58-60 (describing the classic experimental design and procedure). *See also* DAVID DE VALUS, RESEARCH DESIGN IN SOCIAL RESEARCH 53-55, 58 (2003)(introducing classic experimental design and procedures and also explaining how use of control groups in experiment design help control for unknown factors that may explain treatment effects; if both groups are identical and very similar, then they are likely equally exposed to these outside unknown factors, such that any observed effects would show up for both groups, discounting intervention or treatment effects as the cause); CAMPBELL & STANLEY, *supra* note 27, at 13-34 (providing an extensive discussion of different forms of experimental design, and how such designs guard against threats to internal and external validity).

135 *See* MATTHEW DAVID & CAROLE D SUTTON SOCIAL RESEARCH: AN INTRODUCTION206 (2d ed., 2011) (discussing some of the challenges with using experimental designs in the "social world"); CHANNELS, *supra* note 133 at 61 (noting the difficulty of doing experiments "outside the laboratory").

136 *See* Wagner et al., *supra* note 27, at 306-307 (defending single group ITS designs as robust, but also noting and discussing many benefits of employing a control group in an ITS design and analysis); Penfold & Zhang, *supra* note 27, at S43 (noting that while single group ITS designs (with segmented regression) can still be carried out in the absence of a proper control group, the "strength of inference is weaker in the absence of the counterfactual outcome.").

137 Wagner et al., *supra* note 27, at 306 ("Ideally, a control group that is identical to the study group but does not experience the intervention is followed over the same time period as the intervention group. Comparing the effect in the intervention group with that in the control group then allows separating the intervention effect from others that may have occurred at the same time.").

138 Wagner et al., *supra* note 27, at 306 (noting the experimental and control groups are compared); Penfold & Zhang, *supra* note 27, at S40-S41 (noting the importance of comparison between the experimental and control groups).

139 PRIVACY IMPACT ASSESSMENT (2013), *supra* note 88, at 24.

article similar). The two groups of Wikipedia articles are also created by matching articles with keywords in the same DHS document,[140] so the articles are being drawn from the same "source", again, rendering the groups more similar and closely related for comparative purposes.[141] However, in theory, viewing terrorism-related Wikipedia content is far more likely to raise privacy concerns for Wikipedia users concerned about government surveillance than merely viewing information about security agencies like "Department of Homeland Security" or security "Fusion Centers". As such, article traffic concerning the security-related Wikipedia articles in the quasi-control group should not lead to a June 2013 related chilling effect. The hypothesis, based on chilling effects theory, is that users viewing terrorism-related Wikipedia articles should, by contrast, be more impacted and chilled.[142] This hypothesis is again explored, but this time results are graphed with both linear (first graph) and fractional polynomial trend analysis (second graph) to provide an even clearer

140 Locating Wikipedia articles coinciding with each keyword was again done manually and similarly was very simple as there was a Wikipedia article that corresponded perfectly with the vast majority of keywords in the "DHS and Other Agencies" DHS keyword category. The few discrepancies were these: the Wikipedia article "National Security Operations Center" was used for the keyword "National Operations Center"; the Wikipedia article "biological agent" was used for the DHS keyword "agent"; the Wikipedia article "Joint Task Force" was used for the keyword "Task Force"; the Wikipedia article "Drug Enforcement Administration" was used for the keyword "Drug Enforcement Agency" (this article related to an unknown agency in Liberia); the Wikipedia article "International Federation of Red Cross and Red Crescent Societies" was used for the keyword "Red Cross". Wikipedia articles corresponding with the remaining related keywords were all included in these final set of results, except for the "United Nations" article. This article was excluded from the final results and analysis, as this article, like the Hamas article excluded earlier, was a significant and extreme outlier, exerting substantial influence on a number of observations in the data and distorting results (as apparent from its extreme Cooks D values). As such, it was excluded. It might also be noted that observing the keywords in the "DHS and Other Agencies" category in the DHS document overall, the keyword "United Nations" stands out as more international than domestic. *See* PRIVACY IMPACT ASSESSMENT (2013), *supra* note 88, at 24. The 25 Wikipedia articles included can be viewed in **Appendix F.**

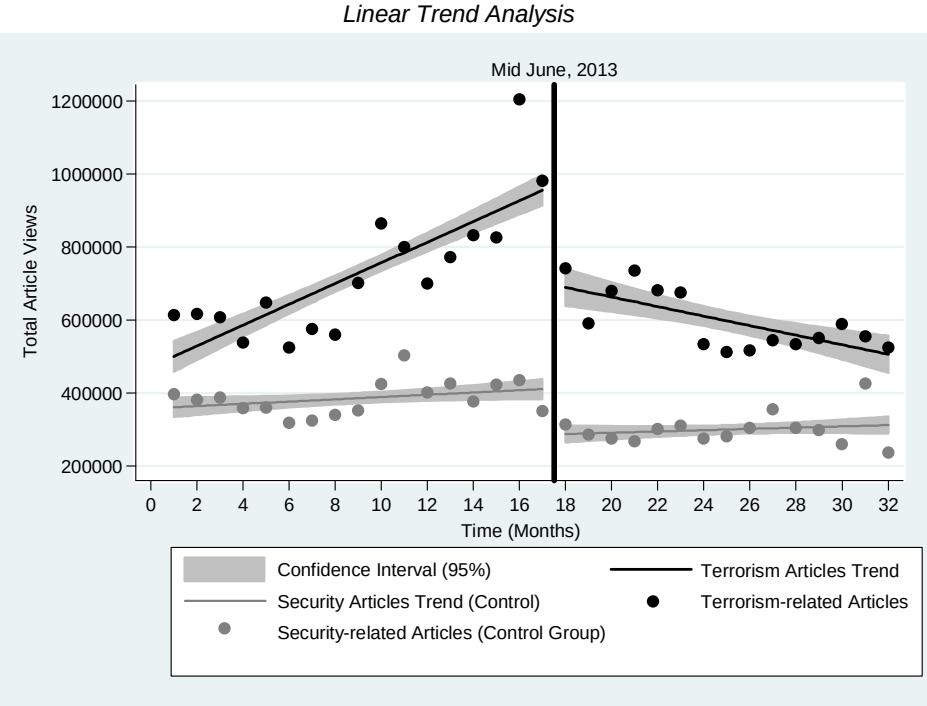
141 This attempts a more robust approach to quasi-control group selection than the more "neutral" set of quasi-control terms employed by Marthews and Tucker. This is because the greater the difference between the test group of terms (or in this case articles) and the control group, the greater the possibility that any observed intervention effect can be explained by some unknown confounding factor variable possessed by the studied group of search terms or Wikipedia articles but not the control group. *See* Wagner et al., *supra* note 27, at 306 (explaining the role of control groups). *See also* Marthews & Tucker, *supra* note 25, at 7 (explaining their use of "neutral" terms as a control).

142 This is another reason why the keywords under the "DHS and Other Agencies" category heading in the DHS document were used to select a quasi-control group as many keywords in the other categories beyond "Terrorism" (e.g., "Domestic Security", "HAZMAT and Nuclear", etc) concern topics or content that may very well raise privacy concerns for users aware of government surveillance online. As such, such terms would not be appropriate as quasi-controls.

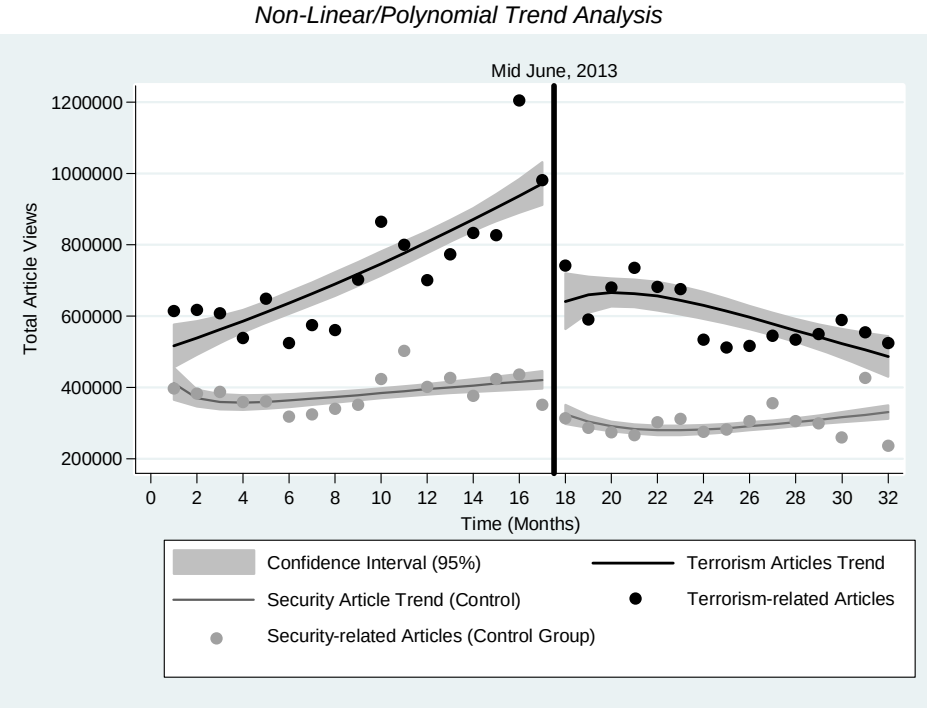
picture of trends in the data (the former best captures linear relationships in the data while the latter best illustrates non-linear relationships, hence the smooth, rather than rigid, trend lines).[143] The final comparative results are available in **Appendix** C and are plotted and visualized in **Figure E:**

Figure E: Terrorism Articles vs. Control Group

The sudden drop and trend reversal for the terrorism-related articles is consistent with chilling effects. The security-related articles control group shows little impact (includes both linear and polynomial trend analysis).



143 Segmented regression was completed, this time employing a fractional polynomial trend analysis for flexibility and to account for any non-linear relationships. *See* Douglas G. Altman & Patrick Royston, *Regression Using Fractional Polynomials of Continuous Covariates: Parsimonious Parametric Modelling* (1994) 43:3 APPL. STATIST. 429, 429-430 (1994) (discussing the usefulness of polynomials to capture non-linear relationships in behavioral data).



Once again, the reduction in views and reversal in trend for the terrorism-related Wikipedia articles, apparent in both **Figure E** graphs, are consistent with a significant and potentially long term chilling effect. Both the immediate drop off (−262,075) is large and the trend change from increasing views monthly (34,764) to fewer (−44,060.4) were statistically significant at the .99 confidence level. In May 2013, the 31 terrorism-related Wikipedia articles were viewed 981,499 times, so the 262,075 views in June represent a sudden drop off of over 25%.

By contrast, article views for the quasi-control group—security-related Wikipedia articles—suggest very little impact, or evidence of chill, associated with the June 2013 revelations. Before June 2013, no clear increasing or decreasing trend is observable in article views and, over the course of June, there is a slight drop in views (−1,098.8), but this is not statistically significant and trivial compared to the significant drop off over June for the terrorism-related Wikipedia articles (−262,075). The common drop in June, however slight, may suggest some minor background factor or event across all Wikipedia articles more generally, but the difference in the reduction (or effect) as between the two groups on this count is so stark (one is large and statistically significant, while the other not), that the results still suggest an immediate chilling effect for the terrorism articles, but not for the control group. In fact, unlike the terrorism article group—which experienced a statistically significant negative trend change (44,060 fewer views a month)—

the control group actually experienced an *increase* in monthly views (9,756) after June 2013. Though not statistically significant, it was nearly so ($p = 0.058$). These observations are also apparent from the visualizations in **Figure E**, where the trend analysis for the quasi-control security-related Wikipedia articles group indicate no long term chilling effects after the June 2013 revelations—the article view trends suggest a slight dip and then, as before June, a slight increase monthly in views, showing no short term or long term impact. This is in contrast to the terrorism-related articles in the study that noticeably trend downward Post-June. In fact, the polynomial trend analysis in the second graph suggests in the future, the trend lines will eventually cross, despite the strong trend towards increasing article readership before June 2013. And the slight curve in the polynomial trend line post June 2013, which curves downward over time, may be evidence of chilling effects interacting with information diffusion—as information about the government surveillance spreads and more learn of it through online and traditional sources and media over time—fewer users view the terrorism-related Wikipedia articles over time as well (in contrast to the security-related articles, which are slightly increasing in views over time).[144]

These findings strengthen the inference that the explanation for the sudden drop during and after June 2013 for the terrorism-related Wikipedia articles, and trend reversal, arise due to surveillance related chilling effects. This inference is supported by the fact that there is no indication in the findings that the similar and similarly situated quasi-control security-related Wikipedia articles were likewise impacted by the June 2013 revelations. The explanation, it can be surmised, is that the security-related Wikipedia articles, though similar, are simply unlikely to raise privacy concerns for Wikipedia users worried about online surveillance. Thus, article views before and after the June 2013 show few noteworthy effects, evening increasing in readership going forward.

144 For a review of research concerning information diffusion and cascading online, see: Rajiv Garg, Michael D. Smith, & Rahul Telang, *Measuring Information Diffusion in an Online Community*, 28:2 JOURNAL OF MANAGEMENT INFORMATION SYSTEMS 11, 11-14 (2011) (reviewing literature on information diffusion theory and related works). *See also* Jennifer Earl, *The Dynamics of Protest Related Diffusion on the Web*, 13:2 INFORMATION, COMMUNICATION, & SOCIETY 209, 209-221 (2010) (reviewing research relevant to information diffusion among social networks online).

VI. IMPLICATIONS

A. EMPIRICAL EVIDENCE FOR REGULATORY CHILLING EFFECTS

Skepticism among courts, legal scholars, and empirical researchers has persisted about the nature, extent, and even existence of chilling effects due, in large part, to a lack of empirical substantiation.[145] The results in this case study, however, provide empirical evidence consistent with chilling effects on the activities of Internet users due to government surveillance. And, to be clear, the activity here is not only legal—accessing information on Wikipedia—but arguably desirable for a healthy democratic society. It involves Internets users informing themselves about important topics subject to today's widespread social, political, moral, and public policy debates.[146] The large, statistically significant, and immediate drop in total views for the Wikipedia articles after June 2013 implies a clear and immediate chilling effect. Moreover, the broad and statistically significant shift in the overall trend in the data (e.g. the shift from the second results excluding outliers) suggests any chilling effects observed may be substantial and long-term, rather than weak, temporary, or ephemeral. This study also bolsters support for the existence of the chilling due to the data upon which it relies. It is among the first studies to demonstrate evidence of such a chilling effect using web traffic data (instead of survey responses or search), and the first to do so in relation both to the potential chilling effects on Wikipedia use, and, more broadly, how such government surveillance and other actions impact how people access and obtain information and knowledge online.

These results are consistent with chilling effects theory but arguably contradict other research concerning online privacy behaviors. First, the substantial body of "privacy paradox" research, involving a diverse range of online platforms and contexts, has demonstrated that Internet users' stated concerns about privacy are often not reflected in their online behavior.[147]

145 *See* Kaminski & Witnov, *supra* note 9, at 517 (calling for further research on the "types of surveillance and surveillance cues that cause chilling effects", as well further research on both the magnitude and persistence of such surveillance related chilling effects). *See also* Kendrick, *supra* note 14, at 1657; Nickel, *supra* note 17, at 263; Richards, *supra* note 21, at 1964.

146 Clark McCauley, *Terrorism, Research, and Public Policy: An Overview*, in TERRORISM RESEARCH AND PUBLIC POLICY 134 (C. McCauley, ed., 1991) ("Taken together, the financial, social, political, and moral costs of response to terrorism constitute a challenge to the democratic capacity to govern...").

147 *See generally* Kokolakis, *supra* note 44 (providing a comprehensive explanation and review of "information privacy paradox" literature). *See* Annika Bergström, *Online Privacy Concerns: A Broad Approach to Understanding the Concerns of Different Groups for Different Uses*, 53 COMPUTERS IN HUMAN BEHAVIOR419 (2015), http://www.sciencedirect.com/science/article/pii/S0747563215300364

There have been a range of explanations offered to explain this disconnect,[148] but one common explanation offered by behavioral economists is that online users suffer from "incomplete information" and "bounded rationality" in making decisions about privacy, that is, such decisions are often complex and people are limited both by cognitive ability and knowledge.[149] However, the results here, consistent with the chilling effects hypothesis that users are avoiding certain online content due to privacy concerns about online surveillance, suggest online users are acting both rationally and logically even with incomplete information about the true nature and scope of covert NSA surveillance practices. In other words, privacy concerns are being reflected in online behavior, contrary to the "privacy paradox".

Second, as noted earlier in this article, privacy researchers and legal scholars have also expressed skepticism about the possibility of large scale or long term chilling effects caused by online surveillance due to "desensitization" about privacy concerns in online contexts[150] or because online users adapt quickly to shifting norms, rendering chilling effects arising due to concerns about criminal or civil risks stemming from online activities "temporary".[151] On this count, research has found, for example, a "lax attitude" among users toward the benefits of online privacy (compared, for example, to the benefits of information disclosure);[152] muted user responses to reputational or privacy risks associated with embarrassing behavior being exposed online;[153] and that while negative privacy experiences online prompted users to adjust their sharing practices, their "social or psychological privacy behaviors" online were unaffected.[154] If there even *are* any privacy or surveillance related chilling

148 *See e.g. id.* at 7-9 (reviewing the various interpretations and explanations for paradox).

149 *Id.* at 9.

150 Nickel, *supra* note 17, at 263.

151 *See* Bernescu, *supra* note 18, at 671 ("However, because consumers in the Internet context quickly adapt to changing norms, any such chilling effect will likely be temporary.").

152 Debatin, *supra* note 18, at 83, 100-102 (finding that a majority of Facebook users in their study disclosed a great deal of personal information despite being aware of privacy risks; they attribute this to a "lax attitude"). *See also* Kokolakis, *supra* note 44, at 7 (discussing research on the "privacy calculus" where people weigh the benefits of privacy over disclosure).

153 Hermstrüwer & Dickert, *supra* note 67, at 22-23 (an experimental study on chilling effects finding that risks of "networked publicity" (exposure online of users' embarrassing activities) did not affect users' "privacy valuations" nor "dampen" either "behavioral idiosyncrasies" or the "panoply of different behaviors" involved in the study; they conclude that concerns about surveillance related chilling and conforming effects may be "overstated").

154 Sabine Trepte, Tobias Dienlin, & Leonard Reinecke, *Risky Behaviors: How Online Experiences Influence Privacy Behavior*, in B. Stark, O. Quiring, & N. Jackob, eds., VON DER GUTENBERG-GALAXIS ZUR GOOGLE-GALAXIS [FROM THE GUTENBERG GALAXY TO THE GOOGLE GALAXY] 225-244 (2014) ("After encountering harassing or humiliating status posts or messages, users adjusted the information they posted online. However, negative experiences did not affect social or psychological privacy behaviors. It was shown that the ways that users

effects, such research suggests they may muted, ephemeral, or short-term. The findings here also contradict these studies, suggesting not only an immediate chilling effect associated with the June 2013 surveillance revelations, but a possible longer term chill as well. A determination of whether this trend will continue further into the future is inherently limited by the data set in this study, which only extends to August 2014. Nonetheless the downward trend in the data, overall, does provide evidence of a more permanent impact.

This case study also provides important insights on how to understand chilling effects, particularly how they operate online. Though Schauer and Solove's accounts of chilling effects are closely related, there are important distinctions between the two. Schauer approached chilling effects as mainly resulting from uncertainty in the legal system (e.g., vagueness of legislative enactments) and people's fear of prosecution and legal sanction.[155] Solove, on the other hand, broadened chilling effects theory's outlook by focusing his efforts on surveillance and "executive information gathering."[156] The findings here are more consistent with Solove's approach to chilling effects. On his account, people censor themselves and avoid certain activities not out of fear of prosecution but out of concern for potential future harms due to privacy violations, embarrassing public disclosures, risks of fraud or identity theft, or being labeled a criminal, deviant, or non-conformist by state authorities.[157] Given the lack of evidence of people being prosecuted or punished for accessing information on Wikipedia or similar sites before, during, or after the June 2013 revelations, it is unlikely that actual fear of prosecution can fully explain the chilling effects suggested by these findings of this study. Rather, Solove's notion of surveillance-related "pollution," that is, a broader societal context of self-censorship and conformity arising from ubiquitous and large-scale surveillance, may be the better explanation.[158]

managed their audiences and friends (social privacy) and the kinds of information they shared (psychological privacy) remained unaffected by negative experiences.").

155 *See* Schauer, *supra* note 12, at 693-695 (discussing, among other things, how fear, risk, and uncertainty in the legal process as contributing to potential chilling effects).

156 *See* Solove, *supra* note 14, at 142-151 (exploring and analyzing cases wherein government information gathering implicates the First Amendment and related "chilling effects"). *See also* Solove, *supra* note 32, at 487-489 (identifying surveillance related chilling effects as a "more modern privacy problem" that "does not fit" with more traditional conceptions of privacy harms).

157 *See* Solove, *supra* note 32, at 493-499 (reviewing a range of instances where surveillance and related information gathering activities can lead to chill, self-censorship, inhibition, and other forms of privacy harms).

158 *Id.* at 487-488 (discussing how the broader sets of risks caused by government practices like surveillance, which can be likened to "environmental harm" or "pollution", also should be understood as having broader societal impact beyond any "mental pain and distress" caused to individuals).

This inference is supported by the independent privacy evaluation completed by the 415 respondents recruited through MTurk. Respondents' assessment of all forty-eight keyword topics (the forty-eight keywords corresponded with the forty-eight terrorism-related Wikipedia articles in the case study) and their responses indicated that if they knew the government was monitoring online activities, they would be more likely to avoid the forty-eight topics in question. In other words, their responses suggested a *potential* for chilling effects relating not to fear of prosecution but fears, risks, harms, and threats associated with government surveillance. This point should not be taken too far, however, as the independent evaluators were recruited among MTurk users and not Wikipedia users tracked by the article traffic data in this study. So the findings may not hold for Wikipedia users or Internet users more generally.

B. THE IMPACT OF WAR AND OTHER EXOGENOUS EVENTS

Another important insight from the study is how intervening dramatic external pressures or "exogenous shocks" impact chilling effects. Notwithstanding the evidence both of immediate, substantial, and potentially long-term chilling effects due to awareness of government surveillance, those chilling effects can be affected or impacted by other dramatic intervening events or "exogenous shocks" like war. For instance, the impact that the November 2012, and July 2014 Israeli-Hamas conflicts had on the Wikipedia use chilling effects can be interpreted in two ways. First, it could be argued that these instances of high profile armed conflict "ameliorated" any chilling effects possibly caused by publicity and public awareness of the PRISM/NSA surveillance, as article traffic, at least for one or two of the Wikipedia articles among the forty-eight retrospectively analyzed in the case study, dramatically increased as those conflicts unfolded. People's desire to learn about the Israeli-Hamas conflicts simply overrode any concerns they may have had about the government monitoring information they were accessing online, thus reducing chilling effects.

A second way of interpreting the results, is that the Israeli-Hamas conflicts essentially "hid" or "masked" a broader chilling effect (apparent once the "Hamas" article view data was excluded), by bringing new populations of atypical users to who were less aware of, or concerned by, government surveillance. This would seem to support the findings of Zeitzoff, Kelly, and Lotan who have explored how major conflicts resulted in "significantly higher levels" of social media activity. For example, their findings included the emergence of what they called "ephemeral" users who seemed to only "tweet"

about the 2012 Gaza conflict and nothing else.[159] Perhaps those visiting the Hamas and Palestinian Liberation Organization Wikipedia articles in November 2012 and July 2014 were atypical Wikipedia users and less affected by online government surveillance (and any attendant chilling effects). But there is nothing in this study to so suggest. Clearly, additional research focusing on this aspect of this case study could offer further insights on this dimension of the results.

C. CONSTITUTIONAL LITIGATION

The results in this case study should, first of all, provide important empirical support for the "chilling effects doctrine" in First Amendment law. Skepticism about the chilling effects doctrine dates back decades, and, more recently, scholars have concluded that more research is required to support the "unsubstantiated empirical judgments" of chilling effects claims under the First Amendment (and chilling effects more generally).[160] These results meet this call. Second, the evidence of chilling effects in this case study has important implications for a wide array of present constitutional litigation brought in relation to government surveillance practices. Indeed, a significant challenge for recent lawsuits filed against the NSA and the U.S. government, especially those based on a chilling effects theory like the Wikimedia Foundation complaint, is the issue of standing. A key part of this challenge is the nature of government surveillance online—it is covert and secretive so victims are most often unaware if they have been personally targeted.[161] This is compounded by how the Supreme Court has applied standing in cases involving covert surveillance. The findings of this study may help plaintiffs overcome challenges to standing by providing empirical evidence to ground constitutional claims based on chilling effects and related harms in objective evidence not subjective claims and fears.

The U.S. Supreme Court's recent decision in *Clapper* exemplified existing legal and judicial skepticism of chilling effects. In that decision, a five judge majority dismissed as "too speculative" the plaintiffs' assertion of standing based on a likelihood that their activities would be subject to surveillance in the future.[162] The Court similarly dismissed the additional arguments for

159 Zeitzoff et al., *supra* note 127, at 5; Zeitzoff, *supra* note 127, at 13.

160 Kendrick, *supra* note 14, at 1657.

161 *See* Richards, *supra* note 23, at 1934 ("Although we have laws that protect us against government surveillance, secret government programs cannot be challenged until they are discovered."). *See generally* Slobogin, *supra* note 38 (analyzing legal standing issues in relation to constitutional challenges to NSA and other surveillance related practices).

162 Clapper, *supra* note 4, at 1143 ("Respondents assert that they can establish injury in fact because there is an objectively reasonable likelihood that their communications will be acquired under § 1881a at some point in the future. But respondents' theory of future injury is

standing based on "chilling effects", observing that while prior cases found constitutional violations may arise from chilling effects, such violations could not arise "merely" from a person's "knowledge" or "concomitant fear" about government activities.[163] Relying on its 1973 decision in *Laird*, the Court noted that "[a]llegations of a subjective 'chill' are not an adequate substitute for a claim of specific present objective harm or a threat of specific future harm."[164] Such surveillance related chilling effect claims based on subjective fears were "self-inflicted" injuries, the Court concluded, and thus could not provide standing for the constitutional claims.[165]

Clapper is unlikely the final word on standing based on widespread government surveillance. To begin with, the case was decided in February of 2013, several months *before* the Snowden disclosures and the widespread publicity concerning the PRISM and other government surveillance programs, which have rendered such secretive surveillance more public and thus more subject to scrutiny and challenge.[166] Moreover, commentators like Neil Richards, Luke Milligan, and Christopher Slobogin, among others, have offered persuasive criticisms of the Supreme Courts' approach to standing in *Clapper*.[167] Richards argues that *Clapper*'s approach to standing affirms a "brutal paradox" whereby litigants must prove harms (like chilling effects) arising from secretive covert surveillance but the only party that knows—the government—is not telling.[168] Milligan, on the other hand, offers a compelling argument that the *Clapper* approach to standing and chilling effects claims is inconsistent with the text and history of the Fourth Amendment, which was

too speculative to satisfy the well-established requirement that threatened injury must be 'certainly impending'.").

163 Clapper, *supra* note 4, at 1152.

164 *Id.* (quoting *Laird v. Tatum,* 401 U.S. 1, 13-14 (1972)).

165 *Id.* at 1152-1153 (quoting *Laird v. Tatum,* 401 U.S. 1, 13-14 (1972)).

166 *See* Slobogin, *supra* note 38, at 4 (noting "Thanks to Edward Snowden..." the U.S. federal government has been forced to acknowledge certain surveillance practices, while journalists have shed important additional light).

167 *See* Richards, *supra* note 23, at 1963-1964 (argues, based on the notion of "intellectual privacy" and its importance to the democratic principle of "self-government", that surveillance privacy harms should be recognized under legal standing doctrines and that *Clapper* fails to do so); Luke M. Milligan, *The Forgotten Right to be Secure*, 65 HASTINGS L. J. 713, 732-750 (2014) (argues for a broader approach to standing than recognized in *Clapper*—that would allow earlier Fourth Amendment challenges to concealed government investigative techniques—based on the Fourth Amendment's original understanding as defined by its text, history, and structure); Slobogin, *supra* note 38, at 535-541 (draws on both Richards and Mulligan to argue, among other things, that *Clapper* and its standing requirements undermine the "political process", which is what the standing process was meant to protect). *See also* Lexi Rubow, *Standing in the Way of Privacy Protections*: *The Argument for a Relaxed Article III Standing Requirement for Constitutional and Statutory Cause of Action*, 29 BERK. TECH. L. J. 1007 (2014) (analyzing and critiquing current standing doctrine in light of the difficulties of proving privacy harms).

168 *See* Richards, *supra* note 23, at 1944-45.

originally understood to guarantee freedom not just from individual unreasonable searches but also freedom from "fear" of such searchers.[169] Lastly, Slobogin offers a strong criticism of *Clapper* based on political process theory and the separation of powers, arguing that chilling effects caused by covert surveillance undermine the political process; as a result citizens should have standing to challenge such surveillance in court.[170]

Still, *Clapper* remains the law and thus presents a difficult standard to show injury and standing for "chilling effects" constitutional claims.[171] On this count, this case study's empirical findings will have important implications for present and future litigation. As noted, *Clapper* emphasized the need for evidence beyond "self-inflicted" injuries based on "subjective fears" about chilling effects to support standing.[172] This case study provides empirical support for surveillance-related chilling effects on Wikipedia's users—not on Wikimedia Foundation itself, though it is impacted by virtue of its users being chilling—meaning any constitutional claims are not necessarily subjective, self-inflicted, nor speculative about future harms. The findings also suggest those chilling effects are not trivial or temporary, but significant, sudden, and with a long term impact. The plaintiffs in *Clapper*, whose claims about harms due to chilling effects were based on costs incurred to avoid government surveillance, argued such harms mostly in an empirical vacuum. This approach left their claims vulnerable to *Laird* and its holding that subjective allegations could not create standing. By contrast, this case study provides empirical support for Wikimedia Foundation to assert harm in its lawsuit against the NSA and Justice Department based on chilling effects claims:

> The notion that the N.S.A. is monitoring Wikipedia's users is not, unfortunately, a stretch of the imagination. The harm to Wikimedia and the hundreds of millions of people who visit our websites is clear: Pervasive surveillance has a chilling effect. It stifles freedom of

169 *See* Milligan, *supra* note 167, at 750 ("On the basis of both text and history, the Fourth Amendment right "to be secure" can be fairly read to encompass the right to be 'protected' from unreasonable searches and seizures, and quite possibly the right to be 'free from fear' of such government actions. This broader interpretation of 'to be secure' has important implications for prevailing Fourth Amendment rules and procedure (arguing that the text and history of the Fourth Amendment supports standing for technological chilling effects claims").

170 *See* Slobogin, *supra* note 38, at 535-541 (draws on both Richards and Mulligan to argue, among other things, that *Clapper* and its standing requirements undermine the "political process", which is what the standing process was meant to protect).

171 Slobogin, *supra* note 38, at 6 ("As the outcome in *Clapper* illustrates, because NSA surveillance is, by design, covert, the standing requirement that plaintiffs allege a 'concrete' injury can pose a serious obstacle to parties trying to challenge it...").

172 Clapper, *supra* note 4, at 1152-1153 (quoting Laird v. Tatum, 401 U.S. 1,13-14 (1972)).

> expression and the free exchange of knowledge that Wikimedia was designed to enable.[173]

The results of this case study suggest that the harm produced by chilling effects is not a "stretch of the imagination" at all. The June 2013 surveillance revelations, extensively covered by media, appear to have had a salient and observable chilling effect on Wikipedia users accessing certain Wikipedia articles. Additionally, this case study provides a more general empirical foundation for companies, organizations, and other institutions whose users may have been "chilled" by government surveillance to assert constitutional harms.

D. SURVEILLANCE, WIKIPEDIA, AND DEMOCRATIC SOCIETY

This case study also has implications for the health of democratic deliberation among citizens. Surveillance related chilling effects, in deterring people from exercising their rights and freedoms, have clear implications for individual citizens.[174] However, these same chilling effects also have implications for the broader health of society, threatening what Richards calls "intellectual privacy," which is the freedom to read, think, and communicate privately, essential privileges to democracy and "self government."[175] Chilling effects are indeed a force for conformity and therefore corrosive to "political discourse."[176]

This, in particular, is a problem for Wikipedia. Democratic theorists have long pointed to public deliberation as an essential "tool" to enhance collective understanding and decision-making, and Wikipedia has been found to be an important complement to this democratic process.[177] On this count, Wikipedia provides a collaborative model of knowledge production that strengthens democracy. A study by Nathaniel Klemp and Andrew Forcehimes found that Wikipedia offers enhanced democratic deliberation and collective decision-making through its "model" of citizen engagement and information exchange.[178] And, beyond these important contributions, Wikipedia not only

173 Wales & Tretikov, *supra* note 3.

174 *See* Richards, *supra* note 23, at 1950 (noting that protection against chilling effects is necessary to preserve freedom of speech and thought, two important First Amendment values).

175 Richards, *supra* note 23, at 1959, 1963.

176 BRUCE SCHNEIER, DATA AND GOLIATH: THE HIDDEN BATTLES TO CAPTURE YOUR DATA AND CONTROL YOUR WORLD 95-99 (2015). *See also* RON DEIBERT, BLACK CODE: INSIDE THE BATTLE FOR CYBERSPACE 130-32 (2013); Solove, *supra* note 32, at 494-99.

177 Nathaniel Klemp & Andrew Forcehimes, *From Town-Halls to Wikis: Exploring Wikipedia's Implications for Deliberative Democracy*, 6:2 J. PUB. DELIBERATION 1, 27 (2007) (finding that the Wikipedia model of online interaction offers a "powerful" supplement to traditional face-to-face forms of public deliberation).

178 *Id.* at 31-32.

remains incredibly popular online—every month, Wikipedia is visited by nearly half a billion people from almost every country on earth[179]—but is an increasingly important resource for Internet users to quickly and efficiently inform themselves about government policies, laws, and actions, this better equipping them to "enter into deliberations over political decisions."[180] Moreover, Wikipedia provides a collaborative model of knowledge production that strengthens democracy. A study by Nathaniel Klemp and Andrew Forcehimes found that Wikipedia offers enhanced democratic deliberation and collective decision-making through its "model" of citizen engagement and information exchange.[181]

The importance of Wikipedia as a source of online knowledge and information is highlighted by the data in this case that showed people taking to Wikipedia in dramatic numbers in November 2012 and July 2014, as compared to other months in the study's data set, to inform themselves about "Hamas" during the Israeli and Hamas conflicts. This suggests large populations of Internet users sought to inform themselves about the conflict as media coverage on it unfolded during those months. Whether these users were typical or atypical Wikipedia users, the findings imply that Wikipedia was a key source of information gathering about an contentious and globally covered armed conflict. This conclusion is consistent with prior research on how people seek information about breaking news stories on Wikipedia and how such events impact its contributor communities and content.[182]

But these findings have potentially troubling implications too. Beyond these war-related outliers represented by the Hamas and Palestinian Liberation Organization Wikipedia articles during the Gaza conflict, the case study indicates government surveillance may have a long-term chilling effect on this type of important Wikipedia use. If people are chilled from informing themselves about breaking news stories and other important news events, or from doing simple research online on matters of law, security, and public policy like "terrorism," then chilling effects also have serious implications for public policy and public deliberation on point. With people potentially chilled or deterred from such basic acts of information gathering, people will be less informed, and our broader processes of democratic deliberation will be

179 *See* Michelle Paulson & Geoff Brigham, Wikimedia v. NSA*: Wikimedia Foundation Files Suit Against NSA to Challenge Upstream Mass Surveillance*, WIKIMEDIA BLOG (Mar. 10 2015), http://blog.wikimedia.org/2015/03/10/wikimedia-v-nsa/.

180 *See* Klemp & Forcehimes, *supra* note 177, at 31-32 ("Ideally, such potential applications of the Wikipedia model would enhance existing forms of face-to-face deliberation. The information gathered through such political wikis would help to inform citizens and better equip them to enter into deliberations over political decisions.")

181 *Id.*

182 *See* works cited *supra* note 72-74.

weakened. If "intellectual privacy," as Richards argues, is essential to democracy and "self government" in guaranteeing the space and freedom to read, think, and communicate privately,[183] so too is the freedom (free from insidious surveillance-related chilling effects) to gather basic information from important platforms and resources like Wikipedia that make engaging in acts of thinking, communicating, and decision-making, meaningful.

Finally, Wikipedia has proven valuable beyond merely being an online source of knowledge. As earlier noted, researchers have employed Wikipedia and information the Wikimedia Foundation makes available online about Wikipedia articles and editing activities for a broad range of online and offline research interests, including peer-production, mapping global and local knowledge production, and determining how geography and place are represented online.[184] As a popular and highly successful collaborative peer-production online platform, Wikipedia is also invaluable as a focal point for research exploring collaborative networks and knowledge production. All of this invaluable research is put in doubt if people are chilled from using the site due to government surveillance.

VII. LIMITATIONS

Notwithstanding the significance of this case study's findings and their attendant implications, they have three important limitations. First, the period of the study only extends until August 2014. This means that the persistence of any chilling effects beyond that point remains an open question. Though the findings here suggested a long-term, even permanent, chilling effect, this possibility cannot be confirmed or denied using existing data. Additional research using more recent data could shed some light on this aspect of the study. Second, a true experimental design, one with a true control group—randomly drawn from the identical subject pool or population—was not possible. Given the secrecy surrounding government surveillance practices and their potential wide scope, the research design could not be strengthened by comparing Wikipedia users affected by surveillance with a true control group that had *not* been exposed to online surveillance; the covert nature of the surveillance rendered it impossible to isolate or identify such a group of individuals. This is one of the challenges of studying chilling effects and the impact of surveillance—much of the practices at issue are secret and thus difficult to study systematically. Still, a quasi-control group was included in the final analysis, rendering the final results more robust.

183 Richards, *supra* note 23, at 1950, 1963.

184 *See generally* sources cited *supra* note 72.

A related limitation, is that it was impossible to know (because the data is simply not available) whether Wikipedia users chilled or deterred from viewing the articles included in the study may have been viewing the very same content elsewhere. Ideally, this would be controlled for in an experimental setting, but like all naturalistic or observational studies involving data derived from the field (as here), there are certain variables and factors that cannot be known or controlled. The ITS design, however, provides a robust means to analyze data where, as here, true experimental designs are not possible. Third, the nature of the Wikipedia data also limited the ways in which the research design could have been strengthened in this case study. For example, though the study focused on English Wikipedia articles, article view counts used to construct the time series data set did not distinguish the geographic origins of article views. That distinction would have provided some insight as to whether evidence of chilling effects varied across geographical regions. Further research attempting to address or overcome these limitations would be valuable.

VIII. CONCLUSION AND FUTURE DIRECTIONS

The compelling evidence of chilling effects illustrated in this case study has important implications on multiple fronts. The study's ITS design, combined with a segmented regression analysis and a quasi-control group, also provides a powerful research design and analytical method that can be employed by researchers in other contexts to explore chilling effects and related regulatory impacts.

Yet, there are clear future directions for research too. This case study has focused primarily on whether the June 2013 surveillance revelations had a chilling effect on Wikipedia users and whether there were any immediate implications of the findings on that question. But the *economic* impact of those chilling effects was not explored and further could shed important light on such monetary harms stemming from regulatory chill. As Tucker and Marthews observe in relation to chilling effects on Google search,[185] the findings here suggest that NSA/PRISM programs and other forms of government surveillance may have a substantial impact on the bottom line of online service providers and other businesses. Since Wikipedia is a non-profit collaborative effort, this angle was not explored in depth here; but Wikipedia,

185 Marthews & Tucker, *supra* note 25, at 23 ("From a US competitive standpoint, the longer-run effect observed on international Google users' search behavior indicates that knowledge of US government surveillance of Google could indeed affect their behavior. At the most limited end of the spectrum, it could steer them away from conducting certain searches on US search engines; at the most severe end of the spectrum, they might choose to use non-US search engines.").

like many Online Service Providers, survives through user traffic and contributions, both of which may be chilled temporarily or permanently by government surveillance. In fact, Wikimedia Foundation, the ACLU, and other organizations (like The Nation magazine and Human Rights Watch) that are party to the lawsuit against the NSA and U.S. Justice Department make similar assertions, claiming they have incurred significant costs to preserve privacy and confidentiality in response to the NSA surveillance activities.[186] Moreover, it is also unknown whether the findings in this case study hold for other comparable forms of online information resources. Was Wikipedia, given its prominence as a popular online information provider, unique in being impacted? And were Wikipedia editors and contributors affected differently from general Wikipedia users (e.g., users who merely read Wikipedia articles, but do not produce or edit them). Despite the evidence established in this case study concerning the existence and scope of chilling effects, significant gaps remain in literature. Further work can be done both on Wikipedia and in other online contexts to extend our understanding of regulatory chilling effects in both North America and abroad. Though the true scope of chilling effects still remains to be fully explored and analyzed, this case study nevertheless offers an important contribution to its deeper understanding.

186 *See* Complaint, *supra* note 1, at 15, 22, 24, 26.

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APPENDIX A
First Results, Segmented Regression Analysis

Independent Variable	Coefficients	Standard Error	*P*-value
Coefficient (β_0) Expected Total Views at Beginning of Study	1586224.0	1156233.0	0.181
Secular trend in data (β_1) Change in Total Views (Month to Month) Before 6/2013	36498.2	23105.8	0.126
Change in level (β_2) Change in Total Views Immediately After 6/2013	–**853585.5***	322969.0	0.014
Change in slope (β_3) Change in Total Views (Month to Month) After 6/2013	–31192.5	27308.2	0.263

Note 1: *p< 0.05, **p < 0.01

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APPENDIX B
Second Results, Excluding Outliers and Correcting for Auto-Correlation

Independent Variable	Coefficients	Standard Error	*P*-value
Coefficient (β_0) Expected Total Views at Beginning of Study	**1969435.0****	691764.1	0.008
Secular trend in data (β_1) Change in Total Views (Month to Month) Before 6/2013	30367.3	16015.5	0.069
Change in level (β_2) Change in Total Views Immediately After 6/2013	**–540318.4***	210584.8	0.016
Change in slope (β_3) Change in Total Views (Month to Month) After 6/2013	**–63593.4***	23221.5	0.011

Note 1: *p< 0.05, **p < 0.01

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APPENDIX C
Final Set of Results– Segmented Regression (compared)

31 Terrorism-related Wikipedia Articles Study Group

Independent Variable	Coefficients	Standard Error	*P*-value
Coefficient (β_0) Expected Total Views at Beginning of Study	**806987.4****	276978.7	0.007
Secular trend in data (β_1) Change in Total Views (Month to Month) Before 6/2013	**34764.9****	5518.1	0.000
Change in level (β_2) Change in Total Views Immediately After 6/2013	**–262075.0****	81288.47	0.003
Change in slope (β_3) Change in Total Views (Month to Month) After 6/2013	**–44060.4****	6513.11	0.000

Note 1: **p*< 0.05, ***p* < 0.01

25 Security-related Wikipedia Articles Quasi-Control Group

Independent Variable	Coefficients	Standard Error	*P*-value
Coefficient (β_0) Expected Total Views at Beginning of Study	–116529.2	153860.5	0.456
Secular trend in data (β_1) Change in Total Views (Month to Month) Before 6/2013	**–8192.9***	3963.6	0.049
Change in level (β_2) Change in Total Views Immediately After 6/2013	–1098.8	46894.5	0.981
Change in slope (β_3) Change in Total Views (Month to Month) After 6/2013	9755.7	4917.0	0.058

Note 1: **p*< 0.05, ***p* < 0.01

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APPENDIX C
Independent Ratings Results

The rating is on a scale of 1 to 5, with 1 being "very unlikely" and 5 being "very likely." The "mean rating" is the average of of ratings for all 48 topics.

Rating Type	Mean Rating
Government Trouble Rating	**1.95**
Privacy-Sensitive Rating	**2.01**
Browser History Delete Rating	**2.00**
Avoidance Rating	**2.62**

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APPENDIX D
Topic Keyword – 48 Article Group

Topic Keyword	Wikipedia Articles	Government Trouble	Browser Delete	Privacy Sensitive	Avoidance
Al Qaeda	http://en.wikipedia.org/wiki/Al-Qaeda	2.20	2.11	2.21	2.84
terrorism	http://en.wikipedia.org/wiki/terrorism	2.19	2.05	2.16	2.79
terror	http://en.wikipedia.org/wiki/terror	1.98	1.96	2.01	2.64
attack	http://en.wikipedia.org/wiki/attack	1.92	1.91	1.92	2.56
Iraq	http://en.wikipedia.org/wiki/iraq	1.60	1.74	1.76	2.25
Afghanistan	http://en.wikipedia.org/wiki/afghanistan	1.61	1.71	1.75	2.23
Iran	http://en.wikipedia.org/wiki/iran	1.62	1.73	1.78	2.25
Pakistan	http://en.wikipedia.org/wiki/pakistan	1.59	1.71	1.75	2.22
agro	http://en.wikipedia.org/wiki/agro	1.51	1.80	1.76	2.29
Environmental terrorism	http://en.wikipedia.org/wiki/Environmental_terrorism	2.20	2.20	2.24	2.92
Eco terrorism	http://en.wikipedia.org/wiki/Eco-terrorism	2.22	2.20	2.22	2.92
Conventional weapon	http://en.wikipedia.org/wiki/Conventional_weapon	2.03	2.16	2.07	2.81
Weapons grade	http://en.wikipedia.org/wiki/Weapons-grade	2.18	2.22	2.17	2.99
dirty bomb	http://en.wikipedia.org/wiki/Dirty_bomb	2.72	2.55	2.50	3.45
Nuclear Enrichment	http://en.wikipedia.org/wiki/Nuclear_enrichment	2.22	2.21	2.21	2.92
Nuclear	http://en.wikipedia.org/wiki/nuclear	1.84	1.97	1.91	2.55
Chemical weapon	http://en.wikipedia.org/wiki/Chemical_weapon	2.43	2.36	2.39	3.16
Biological weapon	http://en.wikipedia.org/wiki/Biological_weapon	2.44	2.39	2.39	3.18
Ammonium nitrate	http://en.wikipedia.org/wiki/Ammonium_nitrate	2.49	2.44	2.26	3.24
Improvised explosive device	http://en.wikipedia.org/wiki/Improvised_explosive_device	2.82	2.64	2.53	3.46
Abu Sayyaf	http://en.wikipedia.org/wiki/Abu_Sayyaf	2.02	1.96	1.99	2.57
Hamas	http://en.wikipedia.org/wiki/hamas	1.90	1.93	1.97	2.49
FARC	http://en.wikipedia.org/wiki/FARC	1.83	1.88	1.90	2.46
Irish Republican Army	http://en.wikipedia.org/wiki/Irish_Republican_Army	1.62	1.77	1.83	2.24
Euskadi ta Askatasuna	http://en.wikipedia.org/w/Euskadi_ta_Askatasuna	1.86	1.88	1.88	2.43
Hezbollah	http://en.wikipedia.org/wiki/hezbollah	1.86	1.90	1.96	2.46
Tamil Tigers	http://en.wikipedia.org/wiki/Tamil_Tigers	1.76	1.86	1.87	2.39
PLO	http://en.wikipedia.org/wiki/Palestine_Liberation_Organization	1.77	1.87	1.91	2.42
Palestine Liberation Front	http://en.wikipedia.org/wiki/Palestine_Liberation_Front	1.81	1.89	1.95	2.47
Car bomb	http://en.wikipedia.org/wiki/Car_bomb	2.72	2.61	2.50	3.40
jihad	http://en.wikipedia.org/wiki/jihad	2.15	2.19	2.17	2.89
Taliban	http://en.wikipedia.org/wiki/taliban	2.06	2.03	2.10	2.70
Suicide bomber	http://en.wikipedia.org/wiki/Suicide_bomber	2.25	2.31	2.24	2.97
Suicide attack	http://en.wikipedia.org/wiki/Suicide_attack	2.30	2.36	2.29	3.04
AL Qaeda in the Arabian Peninsula	http://en.wikipedia.org/wiki/Al-Qaeda_in_the_Arabian_Peninsula	2.01	1.98	2.06	2.63
Al Qaeda in the Islamic Maghreb	http://en.wikipedia.org/wiki/Al-Qaeda_in_the_Islamic_Maghreb	2.05	1.98	2.06	2.60
Tehrik-i-Taliban Pakistan	http://en.wikipedia.org/wiki/Tehrik-i-Taliban_Pakistan	1.96	1.96	1.97	2.59
Yemen	http://en.wikipedia.org/wiki/yemen	1.60	1.72	1.74	2.18
Pirates	http://en.wikipedia.org/wiki/pirates	1.44	1.67	1.67	2.10
Extremism	http://en.wikipedia.org/wiki/extremism	1.64	1.90	1.86	2.40
Somalia	http://en.wikipedia.org/wiki/somalia	1.50	1.68	1.67	2.12
Nigeria	http://en.wikipedia.org/wiki/nigeria	1.48	1.66	1.64	2.07
Political radicalism	http://en.wikipedia.org/wiki/Political_radicalism	1.75	1.91	1.97	2.48
Al-Shabaab	http://en.wikipedia.org/wiki/Al-Shabaab	1.84	1.89	1.89	2.48
nationalism	http://en.wikipedia.org/wiki/nationalism	1.48	1.71	1.73	2.20
Recruitment	http://en.wikipedia.org/wiki/recruitment	1.74	1.90	1.87	2.54
Fundamentalism	http://en.wikipedia.org/wiki/fundamentalism	1.60	1.79	1.80	2.32
Islamist	http://en.wikipedia.org/wiki/islamist	1.79	1.89	1.93	2.45
MEANS		**1.95**	**2.00**	**2.01**	**2.62**

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APPENDIX E

Topic Keyword – 31 Article Group

Topic Keyword	Wikipedia Articles	Combined Privacy Rating
Al Qaeda	http://en.wikipedia.org/wiki/Al-Qaeda	2.34
terrorism	http://en.wikipedia.org/wiki/terrorism	2.30
terror	http://en.wikipedia.org/wiki/terror	2.15
Environmental terrorism	http://en.wikipedia.org/wiki/Environmental_terrorism	2.39
Eco terrorism	http://en.wikipedia.org/wiki/Eco-terrorism	2.39
Conventional weapon	http://en.wikipedia.org/wiki/Conventional_weapon	2.27
Weapons grade	http://en.wikipedia.org/wiki/Weapons-grade	2.39
dirty bomb	http://en.wikipedia.org/wiki/Dirty_bomb	2.81
Nuclear Enrichment	http://en.wikipedia.org/wiki/Nuclear_enrichment	2.39
Nuclear	http://en.wikipedia.org/wiki/nuclear	2.07
Chemical weapon	http://en.wikipedia.org/wiki/Chemical_weapon	2.59
Biological weapon	http://en.wikipedia.org/wiki/Biological_weapon	2.60
Ammonium nitrate	http://en.wikipedia.org/wiki/Ammonium_nitrate	2.61
Improvised explosive device	http://en.wikipedia.org/wiki/Improvised_explosive_device	2.86
Abu Sayyaf	http://en.wikipedia.org/wiki/Abu_Sayyaf	2.14
FARC	http://en.wikipedia.org/wiki/FARC	2.02
Euskadi ta Askatasuna	http://en.wikipedia.org/w/Euskadi_ta_Askatasuna	2.01
Hezbollah	http://en.wikipedia.org/wiki/hezbollah	2.05
Palestine Liberation Front	http://en.wikipedia.org/wiki/Palestine_Liberation_Front	2.03
Car bomb	http://en.wikipedia.org/wiki/Car_bomb	2.81
jihad	http://en.wikipedia.org/wiki/jihad	2.35
Taliban	http://en.wikipedia.org/wiki/taliban	2.22
Suicide bomber	http://en.wikipedia.org/wiki/Suicide_bomber	2.44
Suicide attack	http://en.wikipedia.org/wiki/Suicide_attack	2.50
AL Qaeda in the Arabian Peninsula	http://en.wikipedia.org/wiki/Al-Qaeda_in_the_Arabian_Peninsula	2.17
Al Qaeda in the Islamic Maghreb	http://en.wikipedia.org/wiki/Al-Qaeda_in_the_Islamic_Maghreb	2.17
Tehrik-i-Taliban Pakistan	http://en.wikipedia.org/wiki/Tehrik-i-Taliban_Pakistan	2.12
Political radicalism	http://en.wikipedia.org/wiki/Political_radicalism	2.03
Al-Shabaab	http://en.wikipedia.org/wiki/Al-Shabaab	2.03
Recruitment	http://en.wikipedia.org/wiki/recruitment	2.01
Islamist	http://en.wikipedia.org/wiki/islamist	2.02
MEAN		**2.30**

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APPENDIX F

Topic Keyword – 25 Article Quasi Control Group

Topic Keyword	Wikipedia Articles
Department of Homeland Security	https://en.wikipedia.org/wiki/United_States_Department_of_Homeland_Security
Federal Emergency Management Agency	https://en.wikipedia.org/wiki/Federal_Emergency_Management_Agency
Coast Guard	https://en.wikipedia.org/wiki/Coast_guard
U.S._Customs_and_Border_Protection	https://en.wikipedia.org/wiki/U.S._Customs_and_Border_Protection
Border patrol	https://en.wikipedia.org/wiki/Border_Patrol
Secret Service	http://en.wikipedia.org/wiki/United_States_Secret_Service
National Security Operations Center	https://en.wikipedia.org/wiki/National_Security_Operations_Center
Homeland defense	https://en.wikipedia.org/wiki/Homeland_defense
Chemical weapon	https://en.wikipedia.org/wiki/Chemical_weapon
Biological agent	http://en.wikipedia.org/wiki/Biological_agent
Joint Task Force	https://en.wikipedia.org/wiki/Joint_Task_Force
Central Intelligence Agency	https://en.wikipedia.org/wiki/Central_Intelligence_Agency
Fusion center	https://en.wikipedia.org/wiki/Fusion_center
Drug Enforcement Administration	https://en.wikipedia.org/wiki/Drug_Enforcement_Administration
Secure Border Initiative	https://en.wikipedia.org/wiki/Secure_Border_Initiative
Federal Bureau of Investigation	https://en.wikipedia.org/wiki/Federal_Bureau_of_Investigation
ATF	https://en.wikipedia.org/wiki/Bureau_of_Alcohol,_Tobacco,_Firearms_and_Explos
U.S. Citizenship and Immigration Services	https://en.wikipedia.org/wiki/United_States_Citizenship_and_Immigration_Service
Federal Air Marshal Service	https://en.wikipedia.org/wiki/Federal_Air_Marshal_Service
Transportation Security Administration	https://en.wikipedia.org/wiki/Transportation_Security_Administration
Air marshals	https://en.wikipedia.org/wiki/Air_marshal
Federal Aviation Administration	https://en.wikipedia.org/wiki/Federal_Aviation_Administration
National Guard	https://en.wikipedia.org/wiki/National_Guard
International Federation of Red Cross and Red Crescent Societies	https://en.wikipedia.org/wiki/International_Federation_of_Red_Cross_and_Red_Crescent_Societies
U.S. Immigration and Customs Enforcement	https://en.wikipedia.org/wiki/U.S._Immigration_and_Customs_Enforcement